Debian GNU/Hurd 安裝手冊

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本手冊屬於自由軟體，您可以在 GNU 通用公共許可證 (GPL) 的條約下重新發佈和 (或) 修改它。該許可證的內容請參考附錄 F。

Build version of this manual: 20230803.

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Abstract

This document contains installation instructions for the Debian GNU/Hurd 13 system (codename "trixie"), for the 64-bit PC ("hurd-amd64") architecture. It also contains pointers to more information and information on how to make the most of your new Debian system.

警告

This installation guide is based on an earlier manual written for the old Debian installation system (the "boot-floppies"), and has been updated to document the new Debian installer. However, for hurd-amd64, the manual has not been fully updated and fact checked for the new installer. There may remain parts of the manual that are incomplete or outdated or that still document the boot-floppies installer. A newer version of this manual, possibly better documenting this architecture, may be found on the Internet at the debian-installer home page. You may also be able to find additional translations there.

警告

This translation of the installation guide is not up-to-date and currently there is noone actively working on updating it. Keep this in mind when reading it; it may contain outdated or wrong information. Read or double-check the English variant, if in doubt. If you can help us with updating the translation, please contact debian-boot@lists.debian.org or the debian-l10n-xxx mailinglist for this language. Many thanks

在 hurd-amd64 架構上安裝 Debian GNU/Hurd 13

我們非常高興您決定嘗試 Debian，並確信您將發現 Debian 的 GNU/Hurd 發行套件是獨一無二的。Debian GNU/Hurd 集合了來自世界各地的高品質自由軟體，並將它們緊密的整合在一起。您會發現整合後的效果比單純的程式集合還要更好。

我們瞭解大多數使用者都希望跳過閱讀本手冊的步驟並直接安裝 Debian，Debian 安裝程式就是為了實現這個想法而設計的。如果您沒有時間來閱讀整個安裝指南，我們建議您看看 Installation Howto 一文。該文包含了基本安裝過程的簡要介紹，以及安裝過程中遇到錯誤或需要更深入的內容時連向本手冊可用鏈結。Installation Howto 一文請參閱附錄 A。

正如前面所說的，我們還是希望您能抽出時間來閱讀本手冊的大部分內容。這通常能讓您的安裝體驗更詳盡、更成功。

Chapter 1

歡迎使用 Debian

本章將簡要介紹 Debian 計畫和 Debian GNU/Hurd。如果您已經對 Debian 計畫的歷史和 Debian GNU/Hurd 發行套件有一定的瞭解，您可略過本章。

1.1 什麼是 Debian？

Debian 是一個由自願者組成，致力於自由軟體開發並宣揚自由軟體基金會理念的組織。Debian 計畫於 1993 年開始。當時，Ian Murdock 發出一份公開信邀請軟體開發者為這個以當時較新的 Linux 核心為基底一起奉獻完成這一個完整又堅固的軟體套件。起初由 自由軟體基金會 (Free Software Foundation) 資助並受到 GNU 哲理影響的一小群狂熱者，經過多年後成長，現已經演變成 1000 位 Debian 開發者的組織。

Debian 開發人員所做的工作包括有：網站和 FTP 站台管理、圖形設計、軟體許可證的法律分析、編寫文件、當然，還有維護軟體套件。

為了傳遞我們的理念並吸引那些與 Debian 有著相同信仰的開發人員，Debian 計劃發表了許多文件來闡明我們的價值觀和成為 Debian 開發人員的意義。

- Debian 社群契約是一份 Debian 對自由軟體社群的承諾聲明。任何同意遵守此社群契約的人都可以成為維護人員。任何維護人員都能將新軟體引入 Debian —條件是此軟體必須滿足我們對「自由」的衡量尺度，並且必須符合我們的品質標準。

- Debian 自由軟體準則 (Debian Free Software Guidelines)是 Debian 對於自由軟體標準的聲明，該聲明清晰而簡潔。在自由軟體運動中，DFSG 是一份非常有影響力的文件，開放源代碼定義 (The Open Source Definition)便是以 DFSG 為基礎所衍生而出。

- Debian 政策文件 (Debian Policy Manual)是一份有關 Debian 計畫中品質標準的規格說明書。

Debian 開發人員還參與了其他許多計畫。有些是針對 Debian 的，另外則是關於 Linux 社群的。例如：

- 檔案系統架構標準 (Filesystem Hierarchy Standard, FHS) 則是朝 Linux 檔案系統架構標準化的方向努力。FHS 將使軟體開發者能集中精力於程式設計，而不需要擔心軟體套件在不同的 GNU/Linux 發行套件下要如何安裝。

- Debian Jr. 是一個內部計畫，目標是確保 Debian 能向年幼的使用者提供一些有用的東西。

關於 Debian 的更多資訊，請參考 Debian 常見問答集。

1.2 什麼是 GNU/Linux？

GNU/Linux 是個作業系統：一個能讓您與電腦互動並且執行其他程式的系統。

作業系統由許多基礎程式組成，它們是讓電腦接受使用者指令並與之溝通的必要程式；讀取資料或將其寫入硬碟、磁帶或印表機；控制記憶體的使用；以及執行其它軟體。作業系統最重要的部分是核心。在 GNU/Linux 系統中，就是以 Linux 為核心。而系統的其他部分則是由其他程式組成，這些程式主要由 GNU 計畫所提供，或者是針對 GNU 計畫所編寫的。因為單獨的 Linux 核心不能成為一個可以正常工作的作業系統，所以我們更傾向使用"GNU/Linux"一詞來表達人們常用的"Linux"。

GNU/Linux 是以 Unix 作業系統為原型。從一開始，它就被設計為一個多工、多使用者的系統。這些特點使 GNU/Linux 不同於其它知名的作業系統。事實上，GNU/Linux 比您想像的更加不同。對比其他作業系統，沒人擁有 GNU/Linux，大部分的開發工作都是由無償的志願者所完成。

GNU/Linux 濫觴於 1984 年。當時，自由軟體基金會 (Free Software Foundation) 開始發展自由的類 Unix 作業系統，名為 GNU。

The GNU Project has developed a comprehensive set of free software tools for use with Unix™ and Unix-like operating systems such as GNU/Linux. These tools enable users to perform tasks ranging from the mundane (such as copying or removing files from the system) to the arcane (such as writing and compiling programs or doing sophisticated editing in a variety of document formats).

While many groups and individuals have contributed to GNU/Linux, the largest single contributor is still the Free Software Foundation, which created not only most of the tools used in GNU/Linux, but also the philosophy and the community that made GNU/Linux possible.

Linux 核心 (kernel) 的首次面世是在 1991 年。當時，名為 Linus Torvalds 的芬蘭資訊科學系學生在 Usenet 新聞群組 comp.os.minix 上發佈了一種替代 Minix 核心的早期版本。請參考 Linux International 的 Linux 歷史。

Linus Torvalds continues to coordinate the work of several hundred developers with the help of a number of subsystem maintainers. There is an official website for the Linux kernel. Information about the linux-kernel mailing list can be found on the linux-kernel mailing list FAQ.

GNU/Linux users have immense freedom of choice in their software. For example, they can choose from a dozen different command line shells and several graphical desktops. This selection is often bewildering to users of other operating systems, who are not used to thinking of the command line or desktop as something that they can change.

GNU/Linux is also less likely to crash, better able to run more than one program at the same time, and more secure than many operating systems. With these advantages, Linux is the fastest growing operating system in the server market. More recently, Linux has begun to be popular among home and business users as well.

1.3   什麼是 Debian GNU/Linux?

Debian GNU/Linux 是將 Debian 哲學與方法論、GNU 工具集、Linux 核心，以及其他重要的自由軟體結合在一起所構成的獨特的軟體發行套件。該發行套件由大量的軟體套件組成。發行套件中的每個軟體套件都包含了執行檔、腳本、文件和設定資訊，並且擁有一位維護者，其主要職責是保持軟體套件更新、追蹤臭蟲報告，並與軟體原作者保持聯絡。我們龐大的使用者群與臭蟲追蹤系統的結合可以確保問題被及時發現和修復。

Debian 對細節的注重使我們可以生產出高品質、穩定和靈活的發行套件。經過簡單的設定後，可以安裝並應用到各種場合，從精簡的防火牆到桌面科學工作站，甚至高級網路伺服器。

Debian 在進階使用者中非常流行的原因在於它具有優秀的技術，而且它對 Linux 的深入貢獻滿足了社群的需求與期望。現今，Debian 為 Linux 引入的許多特色已經成為非常通用的標準。

例如，Debian 是第一個使用套件管理系統的 Linux 發行套件，它讓安裝和刪除軟體變得容易。而且它還是第一個可以不用重新安裝就能升級的 Linux 發行套件。

Debian 一直是 Linux 開發的領導者。它的開發過程是開放原始碼開開發模式的範例—即使是用於建立和維護一個完整作業系統這樣複雜的任務。

Debian 與其他 Linux 發行套件最大的不同之處在於套件管理系統的特性。這些工具讓 Debian 系統管理員能夠完全控制安裝到系統上的軟體套件，包括安裝單一軟體套件和自動升級整個作業系統；個別軟體套件也可以被保護而不被升級。您甚至可以告訴套件管理系統哪些軟體是您自己編譯的以及它們對其他軟體套件的依賴關係。

為了提防"特洛伊木馬"和其他惡意軟體以保護您的系統，Debian 伺服器會驗證由在 Debian 註冊的維護人員所上傳的軟體套件。Debian 的套件打包人員也會特別注意以安全的方式配置軟體套件。當發佈出去的軟體套件有安全問題時，通常會很快被修復。透過 Debian 的簡易更新選項，可以從網際網路自動下載和安裝各項安全更新。

為您的 Debian GNU/Linux 系統尋求技術支援和聯絡 Debian 開發人員，最主要、也是最好的方法是透過 Debian 計畫的通信論壇 (撰寫本文時已有 327 個通信論壇) 進行溝通。訂閱這些論壇的最簡單方法是透過 Debian 通訊論壇訂閱網頁並填寫相關表單。

1.4　什麼是 Debian GNU/Hurd?

Debian GNU/Hurd is a Debian GNU system with the GNU Hurd —a set of servers running on top of the GNU Mach microkernel.

The Hurd is still unfinished, and is unsuitable for day-to-day use, but work is continuing. The Hurd is currently only being developed for the i386 architecture, although ports to other architectures will be made once the system becomes more stable.

Please note that Debian GNU/Hurd is not a Linux system, and thus some information on Linux system may not apply to it.

請參閱 Debian GNU/Hurd 移植網頁以及 debian-hurd@lists.debian.org 通信論壇來取得更多資訊。

1.5　What is the Debian Installer?

Debian Installer, also known as "d-i", is the software system to install a basic working Debian system. A wide range of hardware such as embedded devices, laptops, desktops and server machines is supported and a large set of free software for many purposes is offered.

The installation is conducted by answering a basic set of questions. Also available are an expert mode that allows to control every aspect of the installation and an advanced feature to perform automated installations. The installed system can be used as is or further customized. The installation can be performed from a multitude of sources: USB, CD/DVD/Blu-Ray or the network. The installer supports localized installations in more than 80 languages.

The installer has its origin in the boot-floppies project, and it was first mentioned by Joey Hess in 2000. Since then the installation system has been continuously developed by volunteers improving and adding more features.

More information can be found on the Debian Installer page, on the Wiki and on the debian-boot mailing list.

1.6　取得 Debian

For information on how to download Debian GNU/Hurd from the Internet or from whom official Debian installation media can be purchased, see the distribution web page. The list of Debian mirrors contains a full set of official Debian mirrors, so you can easily find the nearest one.

Debian 在安裝之後可以很容易的升級。如果有需要，安裝步驟將幫助您建立系統，使您可以在安裝之後立即進行升級。

1.7　取得本文件最新版本

本文件會不斷地修訂。請查閱 Debian 13 網頁 以瞭解最新的 13 版 Debian GNU/Hurd 系統相關資訊。更新的安裝手冊也可以從官方安裝手冊網頁取得。

1.8　本文架構

本文件意在成為 Debian 新手的使用手冊。儘管它已經盡量對您的的專業知識水平做最少的假設，但我們還是假設您對電腦硬體的工作方式有基本的瞭解。

專業使用者也可以在本手冊中找到一些有趣的參考資訊，包括最小安裝所需的空間，Debian 安裝程式支援的硬體細節等等。我們鼓勵專業使用者選擇性的瀏覽本文件。

基本上，本手冊內容以線性鋪陳，從開始安裝帶領您到安裝結束。以下是安裝 Debian GNU/Hurd 的步驟，以及每步驟相關的章節：

1. 確定您的硬體是否滿足安裝系統的要求，請參考章 2。

2. 備份您的系統，並且在安裝 Debian 之前進行必要的規劃和硬體配置，請參考章 3。如果您需要多重開機於不同的作業系統，您可能需要為 Debian 建立硬碟分割區。

3. 您所選擇的安裝方式所需要的安裝文件章 4 取得。

4. The next 章 5 describes booting into the installation system. This chapter also discusses troubleshooting procedures in case you have problems with this step.

5. Perform the actual installation according to 章 6. This involves choosing your language, configuring peripheral driver modules, configuring your network connection, so that remaining installation files can be obtained directly from a Debian server (if you are not installing from a set of DVD installation images), partitioning your hard drives and installation of a base system, then selection and installation of tasks. (Some background about setting up the partitions for your Debian system is explained in 附錄 C.)

6. Boot into your newly installed base system, from 章 7.

當系統安裝完成，您可以閱讀章 8。該章節將解釋在哪裡尋找更多有關 Unix 和 Debian 的資訊，以及如何更換您的核心。

最後，是關於本文件的資訊以及您可以如何對此做出貢獻，請參考附錄 E。

1.9 歡迎為此文件提供幫助

對於任何幫助、建議，特別是補丁，我們都非常感謝。本文件的開發中版本位於 https://d-i.debian.org/manual/。在那裡，您可以看到所有本文件對不同語言以及硬體架構的版本列表。

本文件的原始檔也是公開的。請參考附錄 E 以瞭解如何貢獻您的心力。我們歡迎建議，批評，補丁和錯誤報告 (請以對 installation-guide 軟體套件為名提出臭蟲報告，但是請先檢查該問題是否已經被提出)。

1.10 關於版權與軟體協議

我們相信您曾經閱讀過一些商業軟體的授權—它們通常要求您只能在一台電腦上使用一份軟體拷貝。本系統所使用的授權與它們完全不同。我們鼓勵您在學校或商業機構的每台電腦上安裝本系統。將安裝媒介借給朋友，並幫助他們安裝到電腦上！您甚至可以製造上千份的拷貝，然後將之出售—儘管這會有一些限制。您安裝和使用系統的自由權利是因為 Debian 乃基於自由軟體的緣故。

Calling software free doesn't mean that the software isn't copyrighted, and it doesn't mean that installation media containing that software must be distributed at no charge. Free software, in part, means that the licenses of individual programs do not require you to pay for the privilege of distributing or using those programs. Free software also means that not only may anyone extend, adapt, and modify the software, but that they may distribute the results of their work as well.

> 注
>
> The Debian project, as a pragmatic concession to its users, does make some packages available that do not meet our criteria for being free. These packages are not part of the official distribution, however, and are only available from the contrib or non-free areas of Debian mirrors or on third-party CD/DVD-ROMs; see the Debian FAQ, under "The Debian FTP archives", for more information about the layout and contents of the archives.

系統中很多軟體所使用的許可證是 GNU General Public License(通用公共許可證)，通常簡稱為"GPL"。GPL 要求您將程式的 原始碼隨著二進位拷貝一起發佈；許可證的這項規定確保任何使用者都可以修改軟體。正是由於此規定，所有這類程式的原始碼[1] 都可以在 Debian 系統中取得。

Debian 中的程式還使用許多其他形式的版權聲明和軟體許可證。您可以在您的系統中找到每個軟體套件相關的版權和許可證，它們位於 /usr/share/doc/軟體套件名/copyright ，這些文件在您將軟體套件安裝到系統後就存在了。

Debian 如何判斷軟體是否足夠自由到可以包括在主發行套件中的資訊，請參考 Debian 自由軟軟體準則。

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[1]關於如何從 Debian 原始碼套件中尋找、解開以及建立二進位檔的資訊，請參閱"Debian 軟體套件管理系統入門"中的Debian FAQ。

在此，最重要的法律聲明是此軟體 無擔保。程式設計創造此軟體為的是使社群受益，而不能保證軟體適用於任何特定用途。但是，因為軟體是自由的，您可以修改此軟體以使其能適用於您的需要—並享用其他人透過這種途徑擴充修改後的成果。

Chapter 2

系統需求

本章包括運作 Debian 所需硬體的資訊。您還能找到更多有關 GNU 和 Hurd 所支援硬體的超鏈結資訊。

2.1 支援的硬體

Debian does not impose hardware requirements beyond the requirements of the Linux kernel and the GNU tool-sets. Therefore, any architecture or platform to which the Linux kernel, libc, gcc, etc. have been ported, and for which a Debian port exists, can run Debian. Please refer to the Ports pages at https://www.debian.org/ports/hurd/ for more details on 64-bit PC architecture systems which have been tested with Debian GNU/Hurd.

本章僅包含一些通用的資訊以及在何處可以取得更多資訊的指引，而不試圖列出所有支援 64-bit PC 的硬體配置。

2.1.1 支援的硬體架構

Debian GNU/Linux 13 supports 9 major architectures and several variations of each architecture known as "flavors".

架構	Debian 命名	子架構	風味
AMD64 & Intel 64	amd64		
Intel x86-based	i386	default x86 machines	default
		Xen PV domains only	xen
ARM	armel	Marvell Kirkwood and Orion	marvell
ARM with hardware FPU	armhf	multiplatform	armmp
64bit ARM	arm64		
64bit MIPS (little-endian)	mips64el	MIPS Malta	5kc-malta
		Cavium Octeon	octeon
		Loongson 3	loongson-3
32bit MIPS (little-endian)	mipsel	MIPS Malta	4kc-malta
		Cavium Octeon	octeon
		Loongson 3	loongson-3
Power Systems	ppc64el	IBM POWER8 or newer machines	
64bit IBM S/390	s390x	IPL from VM-reader and DASD	generic

This document covers installation for the 64-bit PC architecture using the Hurd kernel. If you are looking for information on any of the other Debian-supported architectures take a look at the Debian-Ports pages.

This is the first official release of Debian GNU/Hurd for the 64-bit PC architecture. We feel that it has proven itself sufficiently to be released. However, because it has not had the exposure (and hence testing by users) that some other architectures have had, you may encounter a few bugs. Use our Bug

Tracking System to report any problems; make sure to mention the fact that the bug is on the 64-bit PC platform using the Hurd kernel. It can be necessary to use the debian-hurd mailing list as well.

2.1.2   Graphics Hardware Support

Debian's support for graphical interfaces is determined by the underlying support found in X.Org's X11 system, and the kernel. Basic framebuffer graphics is provided by the kernel, whilst desktop environments use X11. Whether advanced graphics card features such as 3D-hardware acceleration or hardware-accelerated video are available, depends on the actual graphics hardware used in the system and in some cases on the installation of additional "firmware" blobs (see 節 2.2).

Details on supported graphics hardware and pointing devices can be found at `https://wiki.freedesktop.org/xorg/`. Debian 13 ships with X.Org version 7.7.

2.1.3   網路連接硬體

Almost any network interface card (NIC) supported by the Hurd kernel should also be supported by the installation system; drivers should normally be loaded automatically.

2.1.4   周邊設備與其他硬體

Hurd supports a large variety of hardware devices such as mice, printers, scanners, PCMCIA/CardBus/-ExpressCard and USB devices. However, most of these devices are not required while installing the system.

2.2   Devices Requiring Firmware

Besides the availability of a device driver, some hardware also requires so-called firmware or microcode to be loaded into the device before it can become operational. This is most common for network interface cards (especially wireless NICs), but for example some USB devices and even some hard disk controllers also require firmware.

With many graphics cards, basic functionality is available without additional firmware, but the use of advanced features requires an appropriate firmware file to be installed in the system.

On many older devices which require firmware to work, the firmware file was permanently placed in an EEPROM/Flash chip on the device itself by the manufacturer. Nowadays most new devices do not have the firmware embedded this way anymore, so the firmware file must be uploaded into the device by the host operating system every time the system boots.

In most cases firmware is non-free according to the criteria used by the Debian GNU/Hurd project and thus cannot be included in the main distribution. If the device driver itself is included in the distribution and if Debian GNU/Hurd legally can distribute the firmware, it will often be available as a separate package from the non-free-firmware section of the archive (prior to Debian GNU/Hurd 12.0: from the non-free section).

However, this does not mean that such hardware cannot be used during installation. Starting with Debian GNU/Hurd 12.0, following the 2022 General Resolution about non-free firmware, official installation images can include non-free firmware packages. By default, `debian-installer` will detect required firmware (based on kernel logs and modalias information), and install the relevant packages if they are found on an installation medium (e.g. on the netinst). The package manager gets automatically configured with the matching components so that those packages get security updates. This usually means that the non-free-firmware component gets enabled, in addition to main.

Users who wish to disable firmware lookup entirely can do so by setting the `firmware=never` boot parameter. It's an alias for the longer `hw-detect/firmware-lookup=never` form.

Unless firmware lookup is disabled entirely, `debian-installer` still supports loading firmware files or packages containing firmware from a removable medium, such as a USB stick. See 節 6.4 for detailed information on how to load firmware files or packages during the installation. Note that `debian-installer` is less likely to prompt for firmware files now that non-free firmware packages can be included on installation images.

If the `debian-installer` prompts for a firmware file and you do not have this firmware file available or do not want to install a non-free firmware file on your system, you can try to proceed without

loading the firmware. There are several cases where a driver prompts for additional firmware because it may be needed under certain circumstances, but the device does work without it on most systems (this e.g. happens with certain network cards using the tg3 driver).

2.3　特別為 GNU/Hurd 採購硬體

If you do have to buy a machine with Windows bundled, carefully read the software license that comes with Windows; you may be able to reject the license and obtain a rebate from your vendor. Searching the Internet for "windows refund" may get you some useful information to help with that.

　　無論是購買一個搭配 Hurd 販售的系統，還是一個已經用過的系統，檢查 Hurd 核心是否支援您的硬體仍然很重要。請檢查您的硬體是否出現在上面的參考資料中。讓推銷員 (或者其他人) 知道您是在為 Hurd 系統採購設備。請支援對 Hurd 友好的硬體銷售商。

2.3.1　避免專有或封閉的硬體

Some hardware manufacturers simply won't tell us how to write drivers for their hardware. Others won't allow us access to the documentation without a non-disclosure agreement that would prevent us from releasing the driver's source code, which is one of the central elements of free software. Since we haven't been granted access to usable documentation on these devices, they simply won't work under Hurd.

　　In many cases there are standards (or at least some de-facto standards) describing how an operating system and its device drivers communicate with a certain class of devices. All devices which comply to such a (de-facto-)standard can be used with a single generic device driver and no device-specific drivers are required. With some kinds of hardware (e.g. USB "Human Interface Devices", i.e. keyboards, mice, etc., and USB mass storage devices like USB flash disks and memory card readers) this works very well and practically every device sold in the market is standards-compliant.

　　In other fields, among them e.g. printers, this is unfortunately not the case. While there are many printers which can be addressed via a small set of (de-facto-)standard control languages and therefore can be made to work without problems in any operating system, there are quite a few models which only understand proprietary control commands for which no usable documentation is available and therefore either cannot be used at all on free operating systems or can only be used with a vendor-supplied closed-source driver.

　　Even if there is a vendor-provided closed-source driver for such hardware when purchasing the device, the practical lifespan of the device is limited by driver availability. Nowadays product cycles have become short and it is not uncommon that a short time after a consumer device has ceased production, no driver updates get made available any more by the manufacturer. If the old closed-source driver does not work anymore after a system update, an otherwise perfectly working device becomes unusable due to lacking driver support and there is nothing that can be done in this case. You should therefore avoid buying closed hardware in the first place, regardless of the operating system you want to use it with.

　　You can help improve this situation by encouraging manufacturers of closed hardware to release the documentation and other resources necessary for us to provide free drivers for their hardware.

2.4　安裝媒介

This section will help you determine which different media types you can use to install Debian. There is a whole chapter devoted to media, 章 4, which lists the advantages and disadvantages of each media type. You may want to refer back to this page once you reach that section.

2.4.1　CD-ROM/DVD-ROM/BD-ROM

Installation from optical disc is supported for most architectures.

2.4.2　網路

The network can be used during the installation to retrieve files needed for the installation. Whether the network is used or not depends on the installation method you choose and your answers to certain questions that will be asked during the installation. The installation system supports most types of network connections (including PPPoE, but not ISDN or PPP), via either HTTP or FTP. After the installation is completed, you can also configure your system to use ISDN and PPP.

2.4.3　硬碟

Booting the installation system directly from a hard disk is another option for many architectures. This will require some other operating system to load the installer onto the hard disk. This method is only recommended for special cases when no other installation method is available.

2.4.4　Un*x 或 GNU 系統

If you are running another Unix-like system, you could use it to install Debian GNU/Hurd without using the `debian-installer` described in the rest of this manual. This kind of install may be useful for users with otherwise unsupported hardware or on hosts which can't afford downtime. If you are interested in this technique, skip to the 節 D.2. This installation method is only recommended for advanced users when no other installation method is available.

2.4.5　支援的儲存系統

The Debian installer contains a kernel which is built to maximize the number of systems it runs on.
　　IDE systems are also supported.

2.5　記憶體與硬碟空間的需求

We recommend at least 512MB of memory and 4GB of hard disk space to perform an installation. For more detailed values, see 節 3.4.

Chapter 3

安裝 Debian GNU/Hurd 之前

本章用於處理在開機安裝程式以安裝 Debian 之前的準備工作。這包括備份您的資料，搜集您的硬體資訊，以及取得其他一些必要的資料。

3.1 安裝概述

首先，提一下關於重新安裝的事情。使用 Debian 時，必須進行完全重新安裝的情況非常少見，可能導致這種情況的大多是硬碟的物理故障。

許多常見的作業系統在遇到嚴重錯誤或者要升級到新的版本時，必須進行重新安裝。就算不需要完全重新安裝，您通常還得把您的應用程式在新系統裡也再重新安裝一遍才行。

在 Debian GNU/Hurd 裡，如果作業系統遇到錯誤，大多數的時候您都能把它修復而不用重新安裝。在這裡，升級不再需要進行大規模的安裝動作，您可以就地升級它，而這些程式也總能和新版的作業系統和平共處。如果一個程式的新版本需要其他程式的更新來支援它，Debian 軟體套件管理系統會自動幫您把所有必須的軟體一併安裝上。關鍵是，Debian 為了避免重新安裝而做了大量努力，所以您盡可以不用去煩心這些問題：我們的安裝程式不是設計來重裝您的舊系統的。

以下將帶領您走過安裝過程的每個步驟：

1. 把將要用來安裝系統的硬碟上的所有資料或者文件都備份下來；

2. 在開始安裝之前，收集您電腦的硬體資料和可能會用到的文件；

3. 在硬碟上為 Debian 保留一塊可以用來建立分割區的空間；

4. Locate and/or download the installer software and any specialized driver or firmware files your machine requires.

5. Set up boot media such as CDs/DVDs/USB sticks or provide a network boot infrastructure from which the installer can be booted.

6. 開機安裝系統；

7. Select the installation language.

8. 如果可能，啟用網路連結；

9. 建立並掛載用來安裝 Debian 的分割區；

10. 等待自動化的下載、安裝和設置基本系統。

11. Select and install additional software.

12. 安裝 boot loader，它負責開機 Debian GNU/Hurd 和 (或) 已有的其他系統。

13. Load the newly installed system for the first time.

如果您在安裝過程中遇到問題，下面的資訊可以幫助您找到每個步驟裡牽涉到的軟體套件。有關這場安裝「戲劇」的「主角」的介紹：

The installer software, debian-installer, is the primary concern of this manual. It detects hardware and loads appropriate drivers, uses dhcp-client to set up the network connection, runs

debootstrap to install the base system packages, and runs tasksel to allow you to install certain additional software. Many more actors play smaller parts in this process, but debian-installer has completed its task when you load the new system for the first time.

To tune the system to your needs, tasksel allows you to choose to install various predefined bundles of software like a Web server or a Desktop environment.

One important option during the installation is whether or not to install a graphical desktop environment, consisting of the X Window System and one of the available graphical desktop environments. If you choose not to select the "Desktop environment" task, you will only have a relatively basic, command line driven system. Installing the Desktop environment task is optional because in relation to a text-mode-only system it requires a comparatively large amount of disk space and because many Debian GNU/Hurd systems are servers which don't really have any need for a graphical user interface to do their job.

Just be aware that the X Window System is completely separate from debian-installer, and in fact is much more complicated. Troubleshooting of the X Window System is not within the scope of this manual.

3.2　備份您的所有資料！

Before you start, make sure to back up every file that is now on your system. If this is the first time a non-native operating system is going to be installed on your computer, it is quite likely you will need to re-partition your disk to make room for Debian GNU/Hurd. Anytime you partition your disk, you run a risk of losing everything on the disk, no matter what program you use to do it. The programs used in the installation of Debian GNU/Hurd are quite reliable and most have seen years of use; but they are also quite powerful and a false move can cost you. Even after backing up, be careful and think about your answers and actions. Two minutes of thinking can save hours of unnecessary work.

If you are creating a multi-boot system, make sure that you have the distribution media of any other present operating systems on hand. Even though this is normally not necessary, there might be situations in which you could be required to reinstall your operating system's boot loader to make the system boot or in a worst case even have to reinstall the complete operating system and restore your previously made backup.

3.3　一些有用的資料

3.3.1　文件

3.3.1.1　安裝手冊

This document you are now reading, in plain ASCII, HTML or PDF format.

- install.zh_TW.txt

- install.zh_TW.html

- install.zh_TW.pdf

3.3.1.2　硬體文件

通常包含設置和使用您的硬體的實用資料。

3.3.2　尋找硬體資訊來源

許多情況下，安裝程式能自動檢測您的硬體。但作為預備，我們建議您還是在安裝之前熟悉一下您的硬體比較好。

取得硬體資料的途徑有：

- 每個硬體附帶的手冊。

- The BIOS/UEFI setup screens of your computer. You can view these screens when you start your computer by pressing a combination of keys. Check your manual for the combination. Often, it is the Delete or the F2 key, but some manufacturers use other keys or key combinations. Usually upon starting the computer there will be a message stating which key to press to enter the setup screen.

- 每個硬體的包裝盒。

- Windows 控制台裡面的系統視窗。

- 其他作業系統裡面的系統指令或工具，包括檔案管理員的顯示。該資源對瞭解隨機存取記憶體和硬碟特別有用。

- 您的系統管理員或者網際網路服務提供商。他們可以告訴您所需的設定網路和電子郵件的相關資料。

Table 3.1 Hardware Information Helpful for an Install

硬體	您需要瞭解的資料
硬碟	您擁有的容量
	它們在系統上的順序
	Whether IDE (also known as PATA), SATA or SCSI.
	可用空間
	分割區。
	安裝有其他作業系統的分割區。
Network interfaces	Type/model of available network interfaces.
印表機	型號與製造商。
顯示卡	Type/model and manufacturer.

3.3.3　硬體相容性

Many products work without trouble on Hurd. Moreover, hardware support in Hurd is improving daily. However, Hurd still does not run as many different types of hardware as some operating systems.

Drivers in Hurd in most cases are not written for a certain "product" or "brand" from a specific manufacturer, but for a certain hardware/chipset. Many seemingly different products/brands are based on the same hardware design; it is not uncommon that chip manufacturers provide so-called "reference designs" for products based on their chips which are then used by several different device manufacturers and sold under lots of different product or brand names.

This has advantages and disadvantages. An advantage is that a driver for one chipset works with lots of different products from different manufacturers, as long as their product is based on the same chipset. The disadvantage is that it is not always easy to see which actual chipset is used in a certain product/brand. Unfortunately sometimes device manufacturers change the hardware base of their product without changing the product name or at least the product version number, so that when having two items of the same brand/product name bought at different times, they can sometimes be based on two different chipsets and therefore use two different drivers or there might be no driver at all for one of them.

For USB and PCI/PCI-Express/ExpressCard devices, a good way to find out on which chipset they are based is to look at their device IDs. All USB/PCI/PCI-Express/ExpressCard devices have so called "vendor" and "product" IDs, and the combination of these two is usually the same for any product based on the same chipset.

On Linux systems, these IDs can be read with the lsusb command for USB devices and with the lspci -nn command for PCI/PCI-Express/ExpressCard devices. The vendor and product IDs are usually given in the form of two hexadecimal numbers, separated by a colon, such as "1d6b:0001".

An example for the output of lsusb: "Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub", whereby 1d6b is the vendor ID and 0002 is the product ID.

An example for the output of lspci -nn for an Ethernet card: "03:00.0 Ethernet controller [0200]: Realtek Semiconductor Co., Ltd. RTL8111/8168B PCI Express Gigabit Ethernet controller [10ec:8168]

(rev 06)". The IDs are given inside the rightmost square brackets, i.e. here 10ec is the vendor- and 8168 is the product ID.

As another example, a graphics card could give the following output: "04:00.0 VGA compatible controller [0300]: Advanced Micro Devices [AMD] nee ATI RV710 [Radeon HD 4350] [1002:954f]".

On Windows systems, the IDs for a device can be found in the Windows device manager on the tab "details", where the vendor ID is prefixed with VEN_ and the product ID is prefixed with DEV_. On newer Windows systems, you have to select the property "Hardware IDs" in the device manager's details tab to actually see the IDs, as they are not displayed by default.

Searching on the internet with the vendor/product ID, "Hurd" and "driver" as the search terms often results in information regarding the driver support status for a certain chipset. If a search for the vendor/product ID does not yield usable results, a search for the chip code names, which are also often provided by lsusb and lspci ("RTL8111" / "RTL8168B" in the network card example and "RV710" in the graphics card example), can help.

3.3.3.1 Testing hardware compatibility with a Live-System

Debian GNU/Hurd is also available as a so-called "live system" for certain architectures. A live system is a preconfigured ready-to-use system in a compressed format that can be booted and used from a read-only medium like a CD or DVD. Using it by default does not create any permanent changes on your computer. You can change user settings and install additional programs from within the live system, but all this only happens in the computer's RAM, i.e. if you turn off the computer and boot the live system again, everything is reset to its defaults. If you want to see whether your hardware is supported by Debian GNU/Hurd, the easiest way is to run a Debian live system on it and try it out.

There are a few limitations in using a live system. The first is that as all changes you do within the live system must be held in your computer's RAM, this only works on systems with enough RAM to do that, so installing additional large software packages may fail due to memory constraints. Another limitation with regards to hardware compatibility testing is that the official Debian GNU/Hurd live system contains only free components, i.e. there are no non-free firmware files included in it. Such non-free packages can of course be installed manually within the system, but there is no automatic detection of required firmware files like in the `debian-installer`, so installation of non-free components must be done manually if needed.

Information about the available variants of the Debian live images can be found at the Debian Live Images website.

3.3.4 網路設置

If your computer is connected to a fixed network (i.e. an Ethernet or equivalent connection —not a dialup/PPP connection) which is administered by somebody else, you should ask your network's system administrator for this information:

- 您的主機名 (也許可以自己決定)。

- 您的網網域名稱。

- 您電腦的 IP 位址。

- 您網路的網路遮罩。

- 預設路由閘道的 IP 位址，如果您的網路有閘道器的話。

- 您的網路中作為 DNS (網域名稱稱服務) 伺服器的系統。

If the network you are connected to uses DHCP (Dynamic Host Configuration Protocol) for configuring network settings, you don't need this information because the DHCP server will provide it directly to your computer during the installation process.

If you have internet access via DSL or cable modem (i.e. over a cable tv network) and have a router (often provided preconfigured by your phone or catv provider) which handles your network connectivity, DHCP is usually available by default.

If you use a WLAN/WiFi network, you should find out:

- The ESSID ("network name") of your wireless network.

- The WEP or WPA/WPA2 security key to access the network (if applicable).

3.4 滿足最低的硬體要求

一旦您收集好您的電腦硬體配備的相關資料，再檢查一下您的硬體，就可以讓您如願以償的安裝系統。

基於您的需求，您也許可以用低於下面表格所列的配備安裝系統。但是，如果無視這些建議的話，多數使用者會安裝失敗。

A Pentium 4, 1GHz system is the minimum recommended for a desktop system.

Table 3.2 建議的最低系統需求

安裝類別	RAM (minimum)	RAM (recommended)	硬碟
無桌面系統	512MB	1GB	4GB
有桌面系統	1GB	2GB	10GB

The minimum values assumes that swap will be enabled and a non-live image is used. The "No desktop" value assumes that the text-based installer (not the graphical one) is used.

The actual minimum memory requirements are a lot less than the numbers listed in this table. With swap enabled, it is possible to install Debian with as little as 475MB. The same goes for the disk space requirements, especially if you pick and choose which applications to install; see 節 D.1 for additional information on disk space requirements.

The installer normally automatically enables memory-saving tricks to be able to run on such low-memory system, but on architectures that are less tested it may miss doing so. It can however be enabled manually by appending the `lowmem=1` or even `lowmem=2` boot parameter (see also 節 6.3.1.1 and 節 5.3.1).

Installation on systems with less memory or disk space available may be possible but is only advised for experienced users.

It is possible to run a graphical desktop environment on older or low-end systems, but in that case it is recommended to install a window manager that is less resource-hungry than those of the GNOME or KDE Plasma desktop environments; alternatives include `xfce4`, `icewm` and `wmaker`, but there are others to choose from.

It is practically impossible to give general memory or disk space requirements for server installations as those very much depend on what the server is to be used for.

Remember that these sizes don't include all the other materials which are usually to be found, such as user files, mail, and data. It is always best to be generous when considering the space for your own files and data.

Disk space required for the smooth operation of the Debian GNU/Hurd system itself is taken into account in these recommended system requirements. Notably, the `/var` partition contains a lot of state information specific to Debian in addition to its regular contents, like logfiles. The dpkg files (with information on all installed packages) can easily consume 40MB. Also, apt puts downloaded packages here before they are installed. You should usually allocate at least 200MB for `/var`, and a lot more if you install a graphical desktop environment.

3.5 為多重開機系統事先分割磁碟

分割您的硬碟指的僅是將您的硬碟空間切分成幾塊。分割之後，每一塊都是獨立於其餘部分的單獨空間。這和在一個大房幾里砌堵牆有幾分相似如果您在其中一間房間裡安置傢俱，不會對其它房間有任何影響。

If you already have an operating system on your system (Windows, OS/2, MacOS, Solaris, FreeBSD, …) which uses the whole disk and you want to stick Debian on the same disk, you will need to repartition it. Debian requires its own hard disk partitions. It cannot be installed on Windows or Mac OS X partitions. It may be able to share some partitions with other Unix systems, but that's not covered here. At the very least you will need a dedicated partition for the Debian root filesystem.

You can find information about your current partition setup by using a partitioning tool for your current operating system, such as the integrated Disk Manager in Windows. Partitioning tools always provide a way to show existing partitions without making changes.

在一般情況下，改動一個已經建立檔案系統的分割區，會導致其中的資料遭到損毀。因而，您每次都應當在重新分割之前先做好備份。繼續拿房幾作比喻，在移動牆壁時，您最好在把擋路的傢俱都移開，否則就要冒著傢俱被破壞的危險。

Several modern operating systems offer the ability to move and resize certain existing partitions without destroying their contents. This allows making space for additional partitions without losing

existing data. Even though this works quite well in most cases, making changes to the partitioning of a disk is an inherently dangerous action and should only be done after having made a full backup of all data. For FAT/FAT32 and NTFS partitions as used by Windows systems, the ability to move and resize them losslessly is provided both by `debian-installer` as well as by the integrated Disk Manager of Windows.

3.6　安裝前硬體和作業系統的相關設定

This section will walk you through pre-installation hardware setup, if any, that you will need to do prior to installing Debian. Generally, this involves checking and possibly changing BIOS/UEFI/system firmware settings for your system. The "BIOS/UEFI" or "system firmware" is the core software used by the hardware; it is most critically invoked during the bootstrap process (after power-up).

3.6.1　Invoking the BIOS/UEFI Set-Up Menu

The BIOS/UEFI provides the basic functions needed to boot your machine and to allow your operating system to access your hardware. Your system provides a BIOS/UEFI setup menu, which is used to configure the BIOS/UEFI. To enter the BIOS/UEFI setup menu you have to press a key or key combination after turning on the computer. Often it is the Delete or the F2 key, but some manufacturers use other keys. Usually upon starting the computer there will be a message stating which key to press to enter the setup screen.

3.6.2　選擇開機設備

Within the BIOS/UEFI setup menu, you can select which devices shall be checked in which sequence for a bootable operating system. Possible choices usually include the internal harddisks, the CD/DVD-ROM drive and USB mass storage devices such as USB sticks or external USB harddisks. On modern systems there is also often a possibility to enable network booting via PXE.

Depending on the installation media (CD/DVD ROM, USB stick, network boot) you have chosen you should enable the appropriate boot devices if they are not already enabled.

Most BIOS/UEFI versions allow you to call up a boot menu on system startup in which you select from which device the computer should start for the current session. If this option is available, the BIOS/UEFI usually displays a short message like "press F12 for boot menu" on system startup. The actual key used to select this menu varies from system to system; commonly used keys are F12, F11 and F8. Choosing a device from this menu does not change the default boot order of the BIOS/UEFI, i.e. you can start once from a USB stick while having configured the internal harddisk as the normal primary boot device.

If your BIOS/UEFI does not provide you with a boot menu to do ad-hoc choices of the current boot device, you will have to change your BIOS/UEFI setup to make the device from which the `debian-installer` shall be booted the primary boot device.

Unfortunately some computers may contain buggy BIOS/UEFI versions. Booting `debian-installer` from a USB stick might not work even if there is an appropriate option in the BIOS/UEFI setup menu and the stick is selected as the primary boot device. On some of these systems using a USB stick as boot medium is impossible; others can be tricked into booting from the stick by changing the device type in the BIOS/UEFI setup from the default "USB harddisk" or "USB stick" to "USB ZIP" or "USB CDROM". You may need to configure your BIOS/UEFI to enable "USB legacy support".

If you cannot manipulate the BIOS/UEFI to boot directly from a USB stick you still have the option of using an ISO copied to the stick. Boot `debian-installer` using 節 4.3 and, after scanning the hard drives for an installer ISO image, select the USB device and choose an installation image.

Chapter 4

取得系統安裝媒介

4.1 Official Debian GNU/Hurd installation images

By far the easiest way to install Debian GNU/Hurd is from a set of official Debian installation images. You can buy a set of CDs/DVDs from a vendor (see the CD vendors page). You may also download the installation images from a Debian mirror and make your own set, if you have a fast network connection and a CD/DVD burner (see the Debian CD/DVD page and Debian CD FAQ for detailed instructions). If you have such optical installation media, and they are bootable on your machine, you can skip right to 章 5. Much effort has been expended to ensure the most-used files are on the first DVD image, so that a basic desktop installation can be done with only the first DVD.

Also, keep in mind: if the installation media you are using don't contain some packages you need, you can always install those packages afterwards from your running new Debian system (after the installation has finished). If you need to know on which installation image to find a specific package, visit https://cdimage-search.debian.org/.

If your machine doesn't support booting from optical media, but you do have a set of DVD, you can use an alternative strategy such as hard disk, or manually loading the kernel from the disc to initially boot the system installer. The files you need for booting by another means are also on the disc; the Debian network archive and folder organization on the disc are identical. So when archive file paths are given below for particular files you need for booting, look for those files in the same directories and subdirectories on your installation media.

Once the installer is booted, it will be able to obtain all the other files it needs from the disc.

If you don't have an installation media set, then you will need to download the installer system files and place them on the hard disk or so they can be used to boot the installer.

4.2 從 Debian 鏡像伺服器下載檔案

選擇離您較近的 (因此很可能也是最快的) 鏡像伺服器，請參閱 Debian 鏡像列表。

4.2.1 Where to Find Installation Files

Various installation files can be found on each Debian mirror in the directory debian/dists/trixie/main/-installer-hurd-amd64/current/images/ —the MANIFEST lists each image and its purpose.

4.3 準備從硬碟開機的檔案

The installer may be booted using boot files placed on an existing hard drive partition, either launched from another operating system or by invoking a boot loader directly from the BIOS. On modern UEFI systems, the kernel may be booted directly from the UEFI partition without the need of a boot loader.

A full, "pure network" installation can be achieved using this technique. This avoids all hassles of removable media, like finding and burning CD/DVD images.

4.4 自動化安裝

For installing on multiple computers it's possible to do fully automatic installations. Debian packages intended for this include `fai-quickstart`, which can use an install server (have a look at the FAI home page for detailed information) and the Debian Installer itself.

4.4.1 使用 Debian 安裝程式進行自動安裝

The Debian Installer supports automating installs via preconfiguration files. A preconfiguration file can be loaded from the network or from removable media, and used to fill in answers to questions asked during the installation process.

Full documentation on preseeding including a working example that you can edit is in 附錄 B.

4.5 Verifying the integrity of installation files

You can verify the integrity of downloaded files against checksums provided in SHA256SUMS or SHA512SUMS files on Debian mirrors. You can find them in the same places as the installation images itself. Visit the following locations:

- checksum files for CD images,

- checksum files for DVD images,

- checksum files for other installation files.

To compute the checksum of a downloaded installation file, use

```
sha256sum filename.iso
```

respective

```
sha512sum filename.iso
```

and then compare the shown checksum against the corresponding one in the SHA256SUMS respective SHA512SUMS file.

The Debian CD FAQ has more useful information on this topic (such as the script `check_debian_iso`, to semi-automate above procedure), as well as instructions, how to verify the integrity of the above checksum files themselves.

Chapter 5

啟動安裝系統

5.1　在 64-bit PC 上啟動安裝程式

警告

> ⚠️　If you have any other operating systems on your system that you wish to keep (dual boot setup), you should make sure that they have been properly shut down before you boot the installer. Installing an operating system while another operating system is in hibernation (has been suspended to disk) could result in loss of, or damage to the state of the suspended operating system which could cause problems when it is rebooted.

5.1.1　Booting from optical disc (CD/DVD)

If you have a set of optical discs, and your machine supports booting directly off those, great! Simply insert the disc, reboot, and proceed to the next chapter.

Note that certain optical drives may require special drivers, and thus be inaccessible in the early installation stages. If it turns out the standard way of booting off an optical disc doesn't work for your hardware, revisit this chapter and read about alternate kernels and installation methods which may work for you.

Even if you cannot boot from optical disc, you can probably install the Debian system components and any packages you want from such disc. Simply boot using a different medium and when it's time to install the operating system, base system, and any additional packages, point the installation system at the optical drive.

如果您遇到開機方面的問題，請參閱節 5.4。

5.2　Accessibility

Some users may need specific support because of e.g. some visual impairment. accessibility features have to be enabled manually. Some boot parameters can be appended to enable accessibility features. Note that on most architectures the boot loader interprets your keyboard as a QWERTY keyboard.

5.2.1　Installer front-end

The Debian installer supports several front-ends for asking questions, with varying convenience for accessibility: notably, `text` uses plain text while `newt` uses text-based dialog boxes. The choice can be made at the boot prompt, see the documentation for `DEBIAN_FRONTEND` in 節 5.3.1.

With the `newt` front-end (used mostly with braille), one mostly just selects answers with arrow keys and presses Enter to validate the choice. Pressing Tab or Shift - Tab allows to switch between dialog

elements, and notably to access the Go Back button, which brings back again to previous questions. Some dialogs contain check boxes, which can be ticked on and off by pressing Space.

   With the `text` front-end (used mostly with speech), one mostly selects answers either by typing their number followed by pressing Enter, or by selecting an answer with arrow keys, and pressing Enter to validate the choice. One can also not type anything and just press Enter to simply accept the default value. Typing < and pressing Enter brings back again to previous questions. When a selection of choices has to be made (e.g. during task selection), one can type ！to express an empty selection.

5.2.2 High-Contrast Theme

For users with low vision, the installer can use a high-contrast color theme that makes it more readable. To enable it, you can use the "Accessible high contrast" entry from the boot screen with the d shortcut, or append the `theme=dark` boot parameter.

5.2.3 Zoom

For users with low vision, the graphical installer has a very basic zoom support: the Control-+ and Control– shortcuts increase and decrease the font size.

5.2.4 Expert install, rescue mode, automated install

Expert, Rescue, and Automated installation choices are also available with accessibility support. To access them, one has to first enter the "Advanced options" submenu from the boot menu by typing a. When using a BIOS system (the boot menu will have beeped only once), this has to be followed by Enter；for UEFI systems (the boot menu will have beeped twice) that must not be done. Then, to enable speech synthesis, s can optionally be pressed (followed again by Enter on BIOS systems but not on UEFI systems). From there, various shortcuts can be used: x for expert installation, r for rescue mode, or a for automated installation. Again these need to be followed by Enter when using a BIOS system.

   The automated install choice allows to install Debian completely automatically by using preseeding, whose source can be entered after accessibility features get started. Preseeding itself is documented in 附錄 B.

5.2.5 Accessibility of the installed system

Documentation on accessibility of the installed system is available on the Debian Accessibility wiki page.

5.3 開機參數

如果這是您第一次開機系統，嘗試預設的開機參數 (即：不要輸入任何參數) 並且檢查是否工作正確。大部分情況下應該如此，如果不是，可以重新啟動，並且檢查需要告訴系統什麼樣的特定參數。

5.3.1 Debian 安裝程式的參數

The installation system recognizes a few additional boot parameters[1] which may be useful.

   A number of parameters have a "short form" that helps avoid the limitations of the kernel command line options and makes entering the parameters easier. If a parameter has a short form, it will be listed in brackets behind the (normal) long form. Examples in this manual will normally use the short form too.

debconf/priority (priority) This parameter sets the lowest priority of messages to be displayed.

---

[1]With current kernels (2.6.9 or newer) you can use 32 command line options and 32 environment options. If these numbers are exceeded, the kernel will panic. Also there is a limit of 255 characters for the whole kernel command line, everything above this limit may be silently truncated.

The default installation uses `priority=high`. This means that both high and critical priority messages are shown, but medium and low priority messages are skipped. If problems are encountered, the installer adjusts the priority as needed.

If you add `priority=medium` as boot parameter, you will be shown the installation menu and gain more control over the installation. When `priority=low` is used, all messages are shown (this is equivalent to the expert boot method). With `priority=critical`, the installation system will display only critical messages and try to do the right thing without fuss.

DEBIAN_FRONTEND This boot parameter controls the type of user interface used for the installer. The current possible parameter settings are:

- `DEBIAN_FRONTEND=noninteractive`
- `DEBIAN_FRONTEND=text`
- `DEBIAN_FRONTEND=newt`
- `DEBIAN_FRONTEND=gtk`

The default frontend is DEBIAN_FRONTEND=newt. DEBIAN_FRONTEND=text may be preferable for serial console installs. Some specialized types of install media may only offer a limited selection of frontends, but the newt and text frontends are available on most default install media. On architectures that support it, the graphical installer uses the gtk frontend.

BOOT_DEBUG 設定此開機參數為 2 將使得安裝程式的啟動程序寫下所有冗長的紀錄。設定為 3 使得除錯介殼在決定性的時間點上能被使用。(離開介殼後將繼續安裝程序。)

BOOT_DEBUG=0 此為預設。

BOOT_DEBUG=1 更多的資訊。

BOOT_DEBUG=2 大量的除錯資訊。

BOOT_DEBUG=3 介殼腳本將在開機期間執行於不同的地方以允許細節上的調整。退出介殼將繼續開機過程。

log_host, log_port Causes the installer to send log messages to a remote syslog on the specified host and port as well as to a local file. If not specified, the port defaults to the standard syslog port 514.

lowmem Can be used to force the installer to a lowmem level higher than the one the installer sets by default based on available memory. Possible values are 1 and 2. See also 節 6.3.1.1.

noshell Prevents the installer from offering interactive shells on tty2 and tty3. Useful for unattended installations where physical security is limited.

debian-installer/framebuffer (fb) Some architectures use the kernel framebuffer to offer installation in a number of languages. If framebuffer causes a problem on your system you can disable the feature using the parameter `fb=false`. Problem symptoms are error messages about bterm or bogl, a blank screen, or a freeze within a few minutes after starting the install.

debian-installer/theme (theme) A theme determines how the user interface of the installer looks (colors, icons, etc.). Which themes are available may differ per frontend. Currently both the newt and gtk frontend have (apart from the default look) only one additional theme named "dark" theme, which was designed for visually impaired users. Set this theme by booting with `theme=dark` (there is also the keyboard shortcut d for this in the boot menu).

netcfg/disable_autoconfig By default, the `debian-installer` automatically probes for network configuration via IPv6 autoconfiguration and DHCP. If the probe succeeds, you won't have a chance to review and change the obtained settings. You can get to the manual network setup only in case the automatic configuration fails.

If you have an IPv6 router or a DHCP server on your local network, but want to avoid them because e.g. they give wrong answers, you can use the parameter `netcfg/disable_autoconfig=true` to prevent any automatic configuration of the network (neither v4 nor v6) and to enter the information manually.

hw-detect/start_pcmcia 設定成 `false` 來阻止啟動 PCMCIA 服務，如果其引起各種問題。有些筆記型電腦對此會有錯誤的行為。

preseed/url (url) Specify the url to a preconfiguration file to download and use for automating the install. See 節 4.4.

preseed/file (file) Specify the path to a preconfiguration file to load for automating the install. See 節 4.4.

preseed/interactive Set to `true` to display questions even if they have been preseeded. Can be useful for testing or debugging a preconfiguration file. Note that this will have no effect on parameters that are passed as boot parameters, but for those a special syntax can be used. See 節 B.5.2 for details.

auto-install/enable (auto) Delay questions that are normally asked before preseeding is possible until after the network is configured. See 節 B.2.3 for details about using this to automate installs.

finish-install/keep-consoles During installations from serial or management console, the regular virtual consoles (VT1 to VT6) are normally disabled in `/etc/inittab`. Set to `true` to prevent this.

cdrom-detect/eject By default, before rebooting, `debian-installer` automatically ejects the optical media used during the installation. This can be unnecessary if the system does not automatically boot off such media. In some cases it may even be undesirable, for example if the optical drive cannot reinsert the media itself and the user is not there to do it manually. Many slot loading, slim-line, and caddy style drives cannot reload media automatically.

設為 `false` 可以禁止自動退出，但要小心確保系統在安裝完後，不會自動從光碟開機。

base-installer/install-recommends (recommends) By setting this option to `false`, the package management system will be configured to not automatically install "Recommends", both during the installation and for the installed system. See also 節 6.3.5.

Note that this option allows to have a leaner system, but can also result in features being missing that you might normally expect to be available. You may have to manually install some of the recommended packages to obtain the full functionality you want. This option should therefore only be used by very experienced users.

debian-installer/allow_unauthenticated By default the installer requires that repositories be authenticated using a known gpg key. Set to `true` to disable that authentication. Warning: insecure, not recommended.

rescue/enable Set to `true` to enter rescue mode rather than performing a normal installation. See 節 8.5.

5.3.2 Using boot parameters to answer questions

With some exceptions, a value can be set at the boot prompt for any question asked during the installation, though this is only really useful in specific cases. General instructions how to do this can be found in 節 B.2.2. Some specific examples are listed below.

debian-installer/language (language), debian-installer/country (country), debian-installer/locale (locale) There are two ways to specify the language, country and locale to use for the installation and the installed system.

The first and easiest is to pass only the parameter `locale`. Language and country will then be derived from its value. You can for example use `locale=de_CH.UTF-8` to select German as language and Switzerland as country (`de_CH.UTF-8` will be set as default locale for the installed system). Limitation is that not all possible combinations of language, country and locale can be achieved this way.

The second, more flexible option is to specify `language` and `country` separately. In this case `locale` can optionally be added to specify a specific default locale for the installed system. Example: `language=en country=DE locale=en_GB.UTF-8`.

anna/choose_modules (modules) Can be used to automatically load installer components that are not loaded by default. Examples of optional components that may be useful are `openssh-client-udeb` (so you can use scp during the installation) and `ppp-udeb` (see 節 D.3).

netcfg/disable_autoconfig Set to `true` if you want to disable IPv6 autoconfiguration and DHCP and instead force static network configuration.

mirror/protocol (protocol) By default the installer will use the http protocol to download files from Debian mirrors and changing that to ftp is not possible during installations at normal priority. By setting this parameter to `ftp`, you can force the installer to use that protocol instead. Note that you cannot select an ftp mirror from a list, you have to enter the hostname manually.

tasksel:tasksel/first (tasks) Can be used to select tasks that are not available from the interactive task list, such as the `kde-desktop` task. See 節 6.3.6.2 for additional information.

5.3.3 Passing parameters to kernel modules

If drivers are compiled into the kernel, you can pass parameters to them as described in the kernel documentation. However, if drivers are compiled as modules and because kernel modules are loaded a bit differently during an installation than when booting an installed system, it is not possible to pass parameters to modules as you would normally do. Instead, you need to use a special syntax recognized by the installer which will then make sure that the parameters are saved in the proper configuration files and will thus be used when the modules are actually loaded. The parameters will also be propagated automatically to the configuration for the installed system.

Note that it is now quite rare that parameters need to be passed to modules. In most cases the kernel will be able to probe the hardware present in a system and set good defaults that way. However, in some situations it may still be needed to set parameters manually.

The syntax to use to set parameters for modules is:

```
module_name.parameter_name=value
```

If you need to pass multiple parameters to the same or different modules, just repeat this. For example, to set an old 3Com network interface card to use the BNC (coax) connector and IRQ 10, you would pass:

```
3c509.xcvr=3 3c509.irq=10
```

5.3.4 Blacklisting kernel modules

Sometimes it may be necessary to blacklist a module to prevent it from being loaded automatically by the kernel and udev. One reason could be that a particular module causes problems with your hardware. The kernel also sometimes lists two different drivers for the same device. This can cause the device to not work correctly if the drivers conflict or if the wrong driver is loaded first.

You can blacklist a module using the following syntax: `module_name.blacklist=yes`. This will cause the module to be blacklisted in `/etc/modprobe.d/blacklist.local` both during the installation and for the installed system.

Note that a module may still be loaded by the installation system itself. You can prevent that from happening by running the installation in expert mode and unselecting the module from the list of modules displayed during the hardware detection phases.

5.4 安裝過程中的障礙排除

5.4.1 Reliability of optical media

Sometimes, especially with older drives, the installer may fail to boot from an optical disc. The installer may also —even after booting successfully from such disc —fail to recognize the disc or return errors while reading from it during the installation.

There are many different possible causes for these problems. We can only list some common issues and provide general suggestions on how to deal with them. The rest is up to you.

There are two very simple things that you should try first.

- If the disc does not boot, check that it was inserted correctly and that it is not dirty.

- If the installer fails to recognize the disc, try just running the option Detect and mount installation media a second time. Some DMA related issues with very old CD-ROM drives are known to be resolved in this way.

If this does not work, then try the suggestions in the subsections below. Most, but not all, suggestions discussed there are valid for CD-ROM and DVD.

If you cannot get the installation working from optical disc, try one of the other installation methods that are available.

5.4.1.1 Common issues

- Some older CD-ROM drives do not support reading from discs that were burned at high speeds using a modern CD writer.

- Some very old CD-ROM drives do not work correctly if "direct memory access" (DMA) is enabled for them.

5.4.1.2 How to investigate and maybe solve issues

If the optical disc fails to boot, try the suggestions listed below.

- Check that your BIOS/UEFI actually supports booting from optical disc (only an issue for very old systems) and that booting from such media is enabled in the BIOS/UEFI.

- If you downloaded an iso image, check that the md5sum of that image matches the one listed for the image in the MD5SUMS file that should be present in the same location as where you downloaded the image from.

```
$ md5sum debian-testing-i386-netinst.iso
a20391b12f7ff22ef705cee4059c6b92  debian-testing-i386-netinst.iso
```

Next, check that the md5sum of the burned disc matches as well. The following command should work. It uses the size of the image to read the correct number of bytes from the disc.

```
$ dd if=/dev/cdrom | \
> head -c 'stat --format=%s debian-testing-i386-netinst.iso' | \
> md5sum
a20391b12f7ff22ef705cee4059c6b92  -
262668+0 records in
262668+0 records out
134486016 bytes (134 MB) copied, 97.474 seconds, 1.4 MB/s
```

If, after the installer has been booted successfully, the disc is not detected, sometimes simply trying again may solve the problem. If you have more than one optical drive, try changing the disc to the other drive. If that does not work or if the disc is recognized but there are errors when reading from it, try the suggestions listed below. Some basic knowledge of Hurd is required for this. To execute any of the commands, you should first switch to the second virtual console (VT2) and activate the shell there.

- Switch to VT4 or view the contents of /var/log/syslog (use nano as editor) to check for any specific error messages. After that, also check the output of dmesg.

- Check in the output of dmesg if your optical drive was recognized. You should see something like (the lines do not necessarily have to be consecutive):

```
ata1.00: ATAPI: MATSHITADVD-RAM UJ-822S, 1.61, max UDMA/33
ata1.00: configured for UDMA/33
scsi 0:0:0:0: CD-ROM            MATSHITA DVD-RAM UJ-822S  1.61 PQ: 0 ANSI: 5
sr0: scsi3-mmc drive: 24x/24x writer dvd-ram cd/rw xa/form2 cdda tray
cdrom: Uniform CD-ROM driver Revision: 3.20
```

If you don't see something like that, chances are the controller your drive is connected to was not recognized or may be not supported at all. If you know what driver is needed for the controller, you can try loading it manually using modprobe.

- Check that there is a device node for your optical drive under /dev/. In the example above, this would be /dev/sr0. There should also be a /dev/cdrom.

- Use the mount command to check if the optical disc is already mounted; if not, try mounting it manually:

```
$ mount /dev/hdc /cdrom
```

Check if there are any error messages after that command.

- Check if DMA is currently enabled:

```
$ cd /proc/ide/hdc
$ grep using_dma settings
using_dma       1       0       1       rw
```

A "1" in the first column after using_dma means it is enabled. If it is, try disabling it:

```
$ echo -n "using_dma:0" >settings
```

Make sure that you are in the directory for the device that corresponds to your optical drive.

- If there are any problems during the installation, try checking the integrity of the installation media using the option near the bottom of the installer's main menu. This option can also be used as a general test if the disc can be read reliably.

5.4.2　開機設定

如果在開機過程中您遇到了問題或者核心當掉、無法辨識存在的周邊設備或者辨識錯誤，首先要做的事情是檢查開機參數，如同節 5.3 之中的內容。
　　In some cases, malfunctions can be caused by missing device firmware (see 節 2.2 and 節 6.4).

5.4.3　解讀核心起始資訊

During the boot sequence, you may see many messages in the form can't find something, or something not present, can't initialize something, or even this driver release depends on something. Most of these messages are harmless. You see them because the kernel for the installation system is built to run on computers with many different peripheral devices. Obviously, no one computer will have every possible peripheral device, so the operating system may emit a few complaints while it looks for peripherals you don't own. You may also see the system pause for a while. This happens when it is waiting for a device to respond, and that device is not present on your system. If you find the time it takes to boot the system unacceptably long, you can create a custom kernel later .

5.4.4　Reporting Installation Problems

If you get through the initial boot phase but cannot complete the install, the menu option Save debug logs may be helpful. It lets you store system error logs and configuration information from the installer on a storage medium, or download them using a web browser. This information may provide clues as to what went wrong and how to fix it. If you are submitting a bug report, you may want to attach this information to the bug report.
　　Other pertinent installation messages may be found in /var/log/ during the installation, and /var/log/installer/ after the computer has been booted into the installed system.

5.4.5　回報安裝報告

If you still have problems, please submit an installation report (in English please, whenever possible). We also encourage installation reports to be sent even if the installation is successful, so that we can get as much information as possible on the largest number of hardware configurations.

Note that your installation report will be published in the Debian Bug Tracking System (BTS) and forwarded to a public mailing list. Make sure that you use an e-mail address that you do not mind being made public.

If you have a working Debian system, the easiest way to send an installation report is to install the installation-report and reportbug packages (apt install installation-report reportbug), configure reportbug as explained in 節 8.4.2, and run the command reportbug installation-reports.

Alternatively you can use this template when filling out installation reports, and file the report as a bug report against the installation-reports pseudo package, by sending it to submit@bugs.debian.org.

```
Package: installation-reports

Boot method: <How did you boot the installer? CD/DVD? USB stick? Network?>
Image version: <Full URL to image you downloaded is best>
Date: <Date and time of the install>

Machine: <Description of machine (eg, IBM Thinkpad R32)>
Processor:
Memory:
Partitions: <df -Tl will do; the raw partition table is preferred>

Output of lspci -knn (or lspci -nn):

Base System Installation Checklist:
[O] = OK, [E] = Error (please elaborate below), [ ] = didn't try it

Initial boot:          [ ]
Detect network card:   [ ]
Configure network:     [ ]
Detect media:          [ ]
Load installer modules: [ ]
Detect hard drives:    [ ]
Partition hard drives: [ ]
Install base system:   [ ]
Clock/timezone setup:  [ ]
User/password setup:   [ ]
Install tasks:         [ ]
Install boot loader:   [ ]
Overall install:       [ ]

Comments/Problems:

<Description of the install, in prose, and any thoughts, comments
     and ideas you had during the initial install.>

Please make sure that any installation logs that you think would
be useful are attached to this report. (You can find them in the installer
system in /var/log/ and later on the installed system under
/var/log/installer.) Please compress large files using gzip.
```

In the bug report, describe what the problem is, including the last visible kernel messages in the event of a kernel hang. Describe the steps that you did which brought the system into the problem state.

Chapter 6

使用 Debian 安裝程式

6.1 安裝程式如何運作

Debian 安裝程式由一些特定功能的元件組成，它們完成各自的安裝任務。每一元件執行任務時，會詢問一些任務相關的問題。每個任務又有各自的優先級，可以在安裝程式開始時設定優先級以決定哪些問題會被問到。

執行預設安裝時，只有必要的 (高優先級) 的問題會被問到。使得安裝過程可以高度自動化，幾乎不需使用者干預。元件按次序執行；至於哪些元件會執行，取決於您使用的安裝方法，以及您的硬體。對於沒有詢問的問題，安裝程式將採用預設值。

如何遇到麻煩，使用者會看到錯誤畫面，並且顯示安裝選單供選擇其它替代操作。如果沒有問題，使用者將不會碰到安裝選單，只需依此回答每個元件的提問。嚴重錯誤提示的優先級為 "critical"，因此使用者總會注意到。

Some of the defaults that the installer uses can be influenced by passing boot arguments when `debian-installer` is started. If, for example, you wish to force static network configuration (IPv6 autoconfiguration and DHCP are used by default if available), you could add the boot parameter `netcfg/disable_au` See 節 5.3.1 for available options.

Power users may be more comfortable with a menu-driven interface, where each step is controlled by the user rather than the installer performing each step automatically in sequence. To use the installer in a manual, menu-driven way, add the boot argument `priority=medium`.

If your hardware requires you to pass options to kernel modules as they are installed, you will need to start the installer in "expert" mode. This can be done by either using the expert command to start the installer or by adding the boot argument `priority=low`. Expert mode gives you full control over `debian-installer`.

In the text-based environment the use of a mouse is not supported. Here are the keys you can use to navigate within the various dialogs. The Tab or right arrow keys move "forward", and the Shift-Tab or left arrow keys move "backward" between displayed buttons and selections. The up and down arrow select different items within a scrollable list, and also scroll the list itself. In addition, in long lists, you can type a letter to cause the list to scroll directly to the section with items starting with the letter you typed and use Pg-Up and Pg-Down to scroll the list in sections. The space bar selects an item such as a checkbox. Use Enter to activate choices.

Some dialogs may offer additional help information. If help is available this will be indicated on the bottom line of the screen by displaying that help information can be accessed by pressing the F1 key.

Error messages and logs are redirected to the fourth console. You can access this console by pressing Left Alt-F4 (hold the left Alt key while pressing the F4 function key); get back to the main installer process with Left Alt-F1.

These messages can also be found in `/var/log/syslog`. After installation, this log is copied to `/var/log/installer/syslog` on your new system. Other installation messages may be found in `/var/log/` during the installation, and `/var/log/installer/` after the computer has been booted into the installed system.

6.2 元件介紹

下面列出安裝程式使用的元件，和各個元件目的的簡要說明。如果您需要瞭解各元件詳細的資訊，請參閱節 6.3。

main-menu 在安裝進行中，顯示元件列表，並執行選中的元件。主選單的優先級設為中，如果您的優先級設為高或緊急 (預設為高)，您不會看到該選單。另一方面，假如出現問題需要您決定，詢問的優先級會臨時調低，讓您解決該問題，選單可能在這種情況下出現。

You can get to the main menu by selecting the Go Back button repeatedly to back all the way out of the currently running component.

localechooser 讓使用者選擇安裝過程以及安裝好的系統所使用的語言、國家和地區選項。除非選取的語言沒有被翻譯，安裝程式將以您選擇的語言顯示資訊。對於沒有翻譯的部分，將以英文顯示。

console-setup Shows a list of keyboard (layouts), from which the user chooses the one which matches his own model.

hw-detect 自動識別大多數系統硬體，包括網卡、硬碟和 PCMCIA。

cdrom-detect Looks for and mounts a Debian installation media.

netcfg 設定電腦網路連線，使它能連上網際網路。

iso-scan Searches for ISO images (.iso files) on hard drives.

choose-mirror 列出 Debian 軟體套件鏡像。使用者可以選擇從哪裡安裝軟體套件。

cdrom-checker Checks integrity of installation media. This way, the user may assure him/herself that the installation image was not corrupted.

lowmem 它會檢測小記憶體容量的系統，並採用一些技巧從記憶體中刪除 debian-installer 不需要的部分 (代價是喪失一些功能)。

anna Anna's Not Nearly APT. Installs packages which have been retrieved from the chosen mirror or installation media.

user-setup Sets up the root password, and adds a non-root user.

clock-setup Updates the system clock and determines whether the clock is set to UTC or not.

tzsetup Selects the time zone, based on the location selected earlier.

partman 讓使用者為系統安排磁碟分割區，建立檔案系統，並分配掛載點。它包括一些有趣的功能，如自動模式或 LVM 支援。在 Debian 裡這是建議的分割工具。

partman-lvm 幫助使用者配置 LVM (Logical Volume Manager)。

partman-md 讓使用者設置軟體 磁碟陣列 (Redundant Array of Inexpensive Disks)。Software RAID 通常比新主機板提供的廉價 IDE (虛擬硬體) RAID 控制器的高級。

base-installer 安裝一些基本的套件，讓電腦重起後能在 Debian GNU/Hurd 下運行。

apt-setup Configures apt, mostly automatically, based on what media the installer is running from.

pkgsel Uses tasksel to select and install additional software.

os-prober 偵測目前電腦上安裝的作業系統，將資訊傳遞給 bootloader-installer，使它能將偵測到的作業系統添加到 bootloader 的啟動選單裡面。方便使用者選擇啟動哪個操作系統。

bootloader-installer The various bootloader installers each install a boot loader program on the hard disk, which is necessary for the computer to start up using Hurd without using a USB stick or CD-ROM. Many boot loaders allow the user to choose an alternate operating system each time the computer boots.

shell 讓使用者能從選單或者第二控制台執行介殼。

save-logs Provides a way for the user to record information on a USB stick, network, hard disk, or other media when trouble is encountered, in order to accurately report installer software problems to Debian developers later.

6.3 使用單獨的元件

本節將會描述各個安裝元件的詳細資訊。各元件按使用者可以識別的階段分組。它們在安裝過程中按次序顯示出來。注意，每次安裝並不會使用所有的模組；至於使用哪些模組，取決於您的安裝方法和您的硬體。

6.3.1 啟動 Debian 安裝程式與配置硬體

假設 Debian 安裝程式已經啟動，然後您看到了初始畫面。此時，`debian-installer` 的能力還很有限。它還不瞭解您的硬體、語言、甚至不知道要執行什麼任務。不用擔心，因為 `debian-installer` 相當聰明，它能自動探測您的硬體，尋找其餘的元件，並更新自己以具備安裝系統的能力。但您仍然要協助 `debian-installer`，不能自動決定的內容 (例如選擇語言，鍵盤配置或網路鏡像站)。

您會留意到 `debian-installer` 在本階段執行硬體偵測多次。第一次目的是指定哪些硬體需要安裝 (例如，您的 CD-ROM 或者網卡)。在第一次執行的時候並不是所有的驅動程式都就緒，硬體偵測會在後續過程裡面多次重複。

During hardware detection `debian-installer` checks if any of the drivers for the hardware devices in your system require firmware to be loaded. If any firmware is requested but unavailable, a dialog will be displayed that allows the missing firmware to be loaded from a removable medium. See 節 6.4 for further details.

6.3.1.1 Check available memory / low memory mode

`debian-installer` 首先要做的一件事是檢測有效的記憶體。如果記憶體有限，該元件將修改後續的安裝進程，使您可以將 Debian GNU/Hurd 安裝到您的系統上。

The first measure taken to reduce memory consumption by the installer is to disable translations, which means that the installation can only be done in English. Of course, you can still localize the installed system after the installation has completed.

If that is not sufficient, the installer will further reduce memory consumption by loading only those components essential to complete a basic installation. This reduces the functionality of the installation system. You will be given the opportunity to load additional components manually, but you should be aware that each component you select will use additional memory and thus may cause the installation to fail.

If the installer runs in low memory mode, it is recommended to create a relatively large swap partition (1–2GB). The swap partition will be used as virtual memory and thus increases the amount of memory available to the system. The installer will activate the swap partition as early as possible in the installation process. Note that heavy use of swap will reduce performance of your system and may lead to high disk activity.

Despite these measures, it is still possible that your system freezes, that unexpected errors occur or that processes are killed by the kernel because the system runs out of memory (which will result in "Out of memory" messages on VT4 and in the syslog).

For example, it has been reported that creating a big ext3 file system fails in low memory mode when there is insufficient swap space. If a larger swap doesn't help, try creating the file system as ext2 (which is an essential component of the installer) instead. It is possible to change an ext2 partition to ext3 after the installation.

It is possible to force the installer to use a higher lowmem level than the one based on available memory by using the boot parameter "lowmem" as described in 節 5.3.1.

6.3.1.2 選擇區域化選項

In most cases the first questions you will be asked concern the selection of localization options to be used both for the installation and for the installed system. The localization options consist of language, location and locales.

您選擇的語言將用於接下來的安裝過程，對話框已經有各種語言翻譯的版本。如果選擇的語言沒有對應翻譯的版本，安裝將預設使用英文。選擇的語言也將助於選擇一個合適的鍵盤配置。

The selected geographic location (in most cases a country) will be used later in the installation process to select the correct time zone and a Debian mirror appropriate for that country. Language and country together will help determine the default locale for your system and select the correct keyboard layout.

首先您將會被要求選擇您偏好的語言。語言清單中，各語言名稱將以英文列出 (左邊)，而語言本身將以適當的文字則列於右邊。清單以英文名稱排序。清單的頂端是一個額外的 "C" 地區選項，選擇 "C" 將使得安裝程序以英文進行；locales 軟體套件將不會安裝在安裝好的系統中，因此系統也不會支援任何地區設定。

Next you will be asked to select your geographic location. If you selected a language that is recognized as an official language for more than one country[1], you will be shown a list of only those countries. To select a country that is not in that list, choose other (the last option). You will then be presented with a list of continents; selecting a continent will lead to a list of relevant countries on that continent.

If the language has only one country associated with it, a list of countries will be displayed for the continent or region the country belongs to, with that country selected as the default. Use the Go Back option to select countries on a different continent.

> **注**
>
> It is important to select the country where you live or where you are located as it determines the time zone that will be configured for the installed system.

If you selected a combination of language and country for which no locale is defined and there exist multiple locales for the language, then the installer will allow you to choose which of those locales you prefer as the default locale for the installed system[2]. In all other cases a default locale will be selected based on the selected language and country.

Any default locale selected as described in the previous paragraph will use UTF-8 as character encoding.

If you are installing at low priority, you will have the option of selecting additional locales, including so-called "legacy" locales[3], to be generated for the installed system; if you do, you will be asked which of the selected locales should be the default for the installed system.

6.3.1.3 選擇鍵盤

鍵盤經常因不同語言使用的字元不同而有不同的配置。選擇一個適合您鍵盤的配置，或者為沒出現的配置選擇一個接近的。一旦系統安裝完畢，您可以從更大的範圍您選擇鍵盤配置 (在安裝完之後用 root 執行 dpkg-reconfigure keyboard-configuration)。

Move the highlight to the keyboard selection you desire and press Enter. Use the arrow keys to move the highlight —they are in the same place in all national language keyboard layouts, so they are independent of the keyboard configuration.

6.3.1.4 尋找 Debian 安裝程式 ISO 映像

當使用 hd-media 方式安裝，將會有尋找和掛載 Debian 安裝程式 iso 映像的動作，用於取得其它的安裝檔案。元件 iso-scan 正是用來完成此任務。

At first, iso-scan automatically mounts all block devices (e.g. partitions and logical volumes) which have some known filesystem on them and sequentially searches for filenames ending with .iso (or .ISO for that matter). Beware that the first attempt scans only files in the root directory and in the first level of subdirectories (i.e. it finds /whatever.iso, /data/whatever.iso, but not /data/tmp/whatever.iso). After an iso image has been found, iso-scan checks its content to determine if the image is a valid Debian iso image or not. In the former case we are done, in the latter iso-scan seeks for another image.

萬一前面嘗試尋找 iso 映像失敗，iso-scan 會詢問您是否原意進行完整的搜索。這次不只查看最上級目錄，而是真正地搜尋整個檔案系統。

如果 iso-scan 找不到您的安裝 iso 映像檔，請重新啟動返回到您以前的作業系統，檢查映像檔名是否正確 (以 .iso 結尾)，是否放在一個能被 debian-installer 識別的檔案系統上，是否損壞 (用 checksum 校驗)。有經驗的 Unix 使用者可以在第二個控制台上完成這些動作，而毋須重新啟動。

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[1]In technical terms: where multiple locales exist for that language with differing country codes.

[2]At medium and low priority you can always select your preferred locale from those available for the selected language (if there's more than one).

[3]Legacy locales are locales which do not use UTF-8, but one of the older standards for character encoding such as ISO 8859-1 (used by West European languages) or EUC-JP (used by Japanese).

Note that the partition (or disk) hosting the ISO image can＇t be reused during the installation process as it will be in use by the installer. To work-around this, and provided that you have enough system memory, the installer can copy the ISO image into RAM before mounting it. This is controlled by the low priority `iso-scan/copy_iso_to_ram` debconf question (it is only asked if the memory requirement is met).

6.3.1.5 Configuring the Network

到了此步驟，如果系統檢測到您有多於網路設備，您將被要求選擇哪個設備是您的主網路介面，例如，您在安裝中要用的那個。其他的網路介面這時不會被設定。您可以在安裝完畢之後去設定額外的介面；請參考 interfaces(5) man 頁。

6.3.1.5.1 Automatic network configuration

By default, `debian-installer` tries to configure your computer＇s network automatically as far as possible. If the automatic configuration fails, that may be caused by many factors ranging from an unplugged network cable to missing infrastructure for automatic configuration. For further explanation in case of errors, check the error messages on the fourth console. In any case, you will be asked if you want to retry, or if you want to perform a manual setup. Sometimes the network services used for autoconfiguration can be slow in their responses, so if you are sure everything is in place, simply start the autoconfiguration attempt again. If autoconfiguration fails repeatedly, you can instead choose the manual network setup.

6.3.1.5.2 Manual network configuration

The manual network setup in turn asks you a number of questions about your network, notably `IP address`, `Netmask`, `Gateway`, `Name server addresses`, and a `Hostname`. Moreover, if you have a wireless network interface, you will be asked to provide your `Wireless ESSID` (＂wireless network name＂) and a `WEP key` or `WPA/WPA2 passphrase`. Fill in the answers from 節 3.3.

> **注**
>
> Some technical details you might, or might not, find handy: the program assumes the network IP address is the bitwise-AND of your system＇s IP address and your netmask. The default broadcast address is calculated as the bitwise OR of your system＇s IP address with the bitwise negation of the netmask. It will also guess your gateway. If you can＇t find any of these answers, use the offered defaults —if necessary, you can change them by editing `/etc/network/interfaces` once the system has been installed.

6.3.1.5.3 IPv4 and IPv6

From Debian GNU/Hurd 7.0 (＂Wheezy＂) onwards, `debian-installer` supports IPv6 as well as the ＂classic＂IPv4. All combinations of IPv4 and IPv6 (IPv4-only, IPv6-only and dual-stack configurations) are supported.

Autoconfiguration for IPv4 is done via DHCP (Dynamic Host Configuration Protocol). Autoconfiguration for IPv6 supports stateless autoconfiguration using NDP (Neighbor Discovery Protocol, including recursive DNS server (RDNSS) assignment), stateful autoconfiguration via DHCPv6 and mixed stateless/stateful autoconfiguration (address configuration via NDP, additional parameters via DHCPv6).

6.3.2 設定使用者和密碼

Just before configuring the clock, the installer will allow you to set up the ＂root＂account and/or an account for the first user. Other user accounts can be created after the installation has been completed.

6.3.2.1 設定 root 密碼

root 帳戶也被稱為超級使用者。系統中的所有安全防護措施對以超級使用者身份登陸者都是無效的。root 帳戶應該僅用來進行系統管理，而且使用時間應該盡可能短。

您所建立的任何密碼都應該包含至少 6 個字元，同時包含大小寫字母，並且最好帶有標點符號等特殊字元。因為超級使用者具有最高權限，因此在您設定 root 密碼時尤其要小心。請避免採用能夠在字典中查到的單詞或者很容易猜測的個人資訊。

如果他人向您索取您的 root 密碼，您也需要特別謹慎。除非您所管理的系統有多位管理員，否則您通常不應該將超級使用者密碼交給別人。

In case you do not specify a password for the "root" user here, this account will be disabled but the sudo package will be installed later to enable administrative tasks to be carried out on the new system. By default, the first user created on the system will be allowed to use the sudo command to become root.

6.3.2.2 建立一個普通使用者

系統會詢問您現在是否希望建立一個普通帳戶。您將使用該帳戶進行日常登陸操作。切記，平時不要使用 root 帳戶登陸或者將其作為個人帳號使用。

為什麼呢？避免使用 root 特權帳戶的一個原因是，它很容易對系統造成無法挽回的破壞。另一個原因是，您有可能被惡意誘使執行特洛伊木馬程式—這是一種在您未知的情況下利用超級使用者權限損害系統安全的程式。任何合格的 Unix 系統管理書籍中都會涉及到這一主題—如果您不是很瞭解這方面的內容，建議您找一本書進行學習。

您首先會被要求輸入使用者的全名。然後要求輸入使用者帳號名；通常為姓之類的即可，並且會成為預設值。最後，您將要求輸入該帳號的密碼。

如果在安裝完畢後您還希望建立其它新帳戶，請使用 adduser 命令。

6.3.3 Configuring the Clock and Time Zone

The installer will first attempt to connect to a time server on the Internet (using the NTP protocol) in order to correctly set the system time. If this does not succeed, the installer will assume the time and date obtained from the system clock when the installation system was booted are correct. It is not possible to manually set the system time during the installation process.

Depending on the location selected earlier in the installation process, you may be shown a list of time zones relevant for that location. If your location has only one time zone and you are doing a default installation, you will not be asked anything and the system will assume that time zone.

In expert mode or when installing at medium priority, you will have the additional option to select "Coordinated Universal Time" (UTC) as time zone.

If for some reason you wish to set a time zone for the installed system that does not match the selected location, there are two options.

1. The simplest option is to just select a different time zone after the installation has been completed and you've booted into the new system. The command to do this is:

```
# dpkg-reconfigure tzdata
```

2. Alternatively, the time zone can be set at the very start of the installation by passing the parameter time/zone=value when you boot the installation system. The value should of course be a valid time zone, for example Europe/London or UTC.

For automated installations the time zone can be set to any desired value using preseeding.

6.3.4 分割區與選擇掛載點

At this time, after hardware detection has been executed a final time, debian-installer should be at its full strength, customized for the user's needs and ready to do some real work. As the title of this section indicates, the main task of the next few components lies in partitioning your disks, creating filesystems, assigning mountpoints and optionally configuring closely related options like RAID, LVM or encrypted devices.

If you are uncomfortable with partitioning, or just want to know more details, see 附錄 C.

First you will be given the opportunity to automatically partition either an entire drive, or available free space on a drive. This is also called "guided" partitioning. If you do not want to autopartition, choose Manual from the menu.

6.3.4.1 Supported partitioning options

The partitioner used in debian-installer is fairly versatile. It allows to create many different partitioning schemes, using various partition tables, file systems and advanced block devices.

Exactly which options are available depends mainly on the architecture, but also on other factors. For example, on systems with limited internal memory some options may not be available. Defaults may vary as well. The type of partition table used by default can for example be different for large capacity hard disks than for smaller hard disks. Some options can only be changed when installing at medium or low debconf priority; at higher priorities sensible defaults will be used.

The following file systems are supported.

- ext2,

- FAT16, FAT32

The partitioner accepts units as power-of-ten (1 MB = 1000 kB = 1000000 B), as well as power-of-two (1 MiB = 1024 kiB = 1048576 B). Unit prefixes are supported until EB/EiB (exabyte/exbibyte).

6.3.4.2 Guided Partitioning

If you choose guided partitioning for a whole disk, you will first be asked to select the disk you want to use. Check that all your disks are listed and, if you have several disks, make sure you select the correct one. The order they are listed in may differ from what you are used to. The size of the disks may help to identify them.

Any data on the disk you select will eventually be lost, but you will always be asked to confirm any changes before they are written to the disk.

Next, you will be able to choose from the schemes listed in the table below. All schemes have their pros and cons, some of which are discussed in 附錄 C. If you are unsure, choose the first one. Bear in mind that guided partitioning needs a certain minimal amount of free space to operate with. If you don't give it at least about 1GB of space (depends on chosen scheme), guided partitioning will fail.

分割區方式	所需最小空間	所新建的分割區
所有檔案在同一分割區	600MB	/, swap
Separate /home partition	500MB	/, /home, swap
Separate /home, /var and /tmp partitions	1GB	/, /home, /var, /tmp, swap

在選定了分割區方式後的下一個畫面，您會看到關於自己分割區的一張表格，上面標明了分割區是否將被格式化，將以何種方式式格式化，以及它們將被掛載到哪裡的相關資訊。

分割區表格的格式如下：

```
SCSI1 (0,0,0) (sda) - 6.4 GB WDC AC36400L
      #1 primary   16.4 MB     ext2        /boot
      #2 primary  551.0 MB     swap        swap
      #3 primary    5.8 GB     ntfs
         pri/log    8.2 MB     FREE SPACE

SCSI2 (1,0,0) (sdb) - 80.0 GB ST380021A
      #1 primary   15.9 MB     ext3
      #2 primary  996.0 MB     fat16
      #3 primary    3.9 GB     xfs         /home
      #5 logical    6.0 GB   f ext4        /
      #6 logical    1.0 GB     ext3        /var
      #7 logical  498.8 GB     ext3
```

本例中有兩塊硬碟，它們分別被分割成了幾個分割區。其中，第一塊硬碟上還有些未使用空間。表中，每行列出了分割區編號、其類型、分割區大小、可選的旗標、採用的檔案系統，及其掛載點 (如果有的話)。

This concludes the guided partitioning. If you are satisfied with the generated partition table, you can choose Finish partitioning and write changes to disk from the menu to implement the new partition table (as described at the end of this section). If you are not happy, you can choose to Undo changes to partitions and run guided partitioning again, or modify the proposed changes as described below for manual partitioning.

6.3.4.3 Manual Partitioning

如果您選擇了手動分割區的話，它的畫面和上面介紹的嚮導式分割區大體上相同。不同之處在於，畫面上顯示的是您目前的分割區列表，而且其中並沒有掛載點的資訊。關於如何手動設置您的分割區表，以及新安裝的 Debian 系統將如何使用這些分割區，這些內容將會在本節的後面談到。

If you select a pristine disk which has neither partitions nor free space on it, you will be asked if a new partition table should be created (this is needed so you can create new partitions). After this, a new line entitled "FREE SPACE" should appear in the table under the selected disk.

If you select some free space, you will have the opportunity to create a new partition. You will have to answer a quick series of questions about its size, type (primary or logical), and location (beginning or end of the free space). After this, you will be presented with a detailed overview of your new partition. The main setting is Use as:, which determines if the partition will have a file system on it, or be used for swap, or not be used at all. Other settings include mountpoint, mount options, and bootable flag; which settings are shown depends on how the partition is to be used. If you don't like the preselected defaults, feel free to change them to your liking. E.g. by selecting the option Use as:, you can choose a different filesystem for this partition, including options to use the partition for swap, or not use it at all. When you are satisfied with your new partition, select Done setting up the partition and you will return to partman's main screen.

If you decide you want to change something about your partition, simply select the partition, which will bring you to the partition configuration menu. This is the same screen as is used when creating a new partition, so you can change the same settings. One thing that may not be very obvious at a first glance is that you can resize the partition by selecting the item displaying the size of the partition. Filesystems known to work are at least fat16, fat32, ext2, ext3 and swap. This menu also allows you to delete a partition.

請確保至少分出兩個分割區：其中一個作為 root 檔案系統 (它必須掛載到 /) 另一個用於 swap。若是您忘記了掛載根 (root) 檔案系統的話，partman 會拒絕讓您繼續下面的步驟，直到您改正了這個錯誤。

對分割區設定感到滿意後，就可以選擇分割區選單中的結束磁碟分割作業並將變更寫入磁碟中一項。在這之後，會出現一個清單，列出即將在硬碟上進行的所有操作。此時，安裝程式會讓您確認是否就照此設定進行分割。

6.3.4.4 Configuring Multidisk Devices (Software RAID)

If you have more than one harddrive[4] in your computer, you can use partman-md to set up your drives for increased performance and/or better reliability of your data. The result is called Multidisk Device (or after its most famous variant software RAID).

MD 本質上是一組位於部分磁碟上的分割區，組合在一起形成一個 邏輯設備。該設備可以像正常的分割區一樣使用 (例如可以用 partman 格式化，分配掛載點，等等)。

What benefits this brings depends on the type of MD device you are creating. Currently supported are:

RAID0 Is mainly aimed at performance. RAID0 splits all incoming data into stripes and distributes them equally over each disk in the array. This can increase the speed of read/write operations, but when one of the disks fails, you will lose everything (part of the information is still on the healthy disk(s), the other part was on the failed disk).

The typical use for RAID0 is a partition for video editing.

RAID1 Is suitable for setups where reliability is the first concern. It consists of several (usually two) equally-sized partitions where every partition contains exactly the same data. This essentially

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[4]To be honest, you can construct an MD device even from partitions residing on single physical drive, but that won't give any benefits.

means three things. First, if one of your disks fails, you still have the data mirrored on the remaining disks. Second, you can use only a fraction of the available capacity (more precisely, it is the size of the smallest partition in the RAID). Third, file-reads are load-balanced among the disks, which can improve performance on a server, such as a file server, that tends to be loaded with more disk reads than writes.

Optionally you can have a spare disk in the array which will take the place of the failed disk in the case of failure.

RAID5 Is a good compromise between speed, reliability and data redundancy. RAID5 splits all incoming data into stripes and distributes them equally on all but one disk (similar to RAID0). Unlike RAID0, RAID5 also computes parity information, which gets written on the remaining disk. The parity disk is not static (that would be called RAID4), but is changing periodically, so the parity information is distributed equally on all disks. When one of the disks fails, the missing part of information can be computed from remaining data and its parity. RAID5 must consist of at least three active partitions. Optionally you can have a spare disk in the array which will take the place of the failed disk in the case of failure.

As you can see, RAID5 has a similar degree of reliability to RAID1 while achieving less redundancy. On the other hand, it might be a bit slower on write operations than RAID0 due to computation of parity information.

RAID6 Is similar to RAID5 except that it uses two parity devices instead of one.

A RAID6 array can survive up to two disk failures.

RAID10 RAID10 combines striping (as in RAID0) and mirroring (as in RAID1). It creates n copies of incoming data and distributes them across the partitions so that none of the copies of the same data are on the same device. The default value of n is 2, but it can be set to something else in expert mode. The number of partitions used must be at least n. RAID10 has different layouts for distributing the copies. The default is near copies. Near copies have all of the copies at about the same offset on all of the disks. Far copies have the copies at different offsets on the disks. Offset copies copy the stripe, not the individual copies.

RAID10 can be used to achieve reliability and redundancy without the drawback of having to calculate parity.

To sum it up:

類型	最少設備	備用設備	倖免於磁碟損壞？	可用空間
RAID0	2	否	否	容量為最小分割區容量乘以 RAID 設備數
RAID1	2	可選	是	容量為 RAID 中的最小分割區
RAID5	3	可選	是	容量為最小分割區乘以 (RAID 設備數量減一)
RAID6	4	可選	是	Size of the smallest partition multiplied by (number of devices in RAID minus two)
RAID10	2	可選	是	Total of all partitions divided by the number of chunk copies (defaults to two)

If you want to know more about Software RAID, have a look at Software RAID HOWTO.

為了建立 MD 設備，您需要將欲參與陣列的分割區標記為供 RAID 使用。(透過 partman 命令中的分割區設定：選單完成，您應該選擇用途： → RAID 的物理容量。)

> 注
>
> Make sure that the system can be booted with the partitioning scheme you are planning. In general it will be necessary to create a separate file system for /boot when using RAID for the root (/) file system. Most boot loaders do support mirrored (not striped!) RAID1, so using for example RAID5 for / and RAID1 for /boot can be an option.

Next, you should choose Configure software RAID from the main partman menu. (The menu will only appear after you mark at least one partition for use as physical volume for RAID.) On the first screen of partman-md simply select Create MD device. You will be presented with a list of supported types of MD devices, from which you should choose one (e.g. RAID1). What follows depends on the type of MD you selected.

- RAID0 是簡單的—您會看到可用的 RAID 分割區，然後您的任務僅是選擇那些想要組成 MD 的分割區。

- RAID1 is a bit more tricky. First, you will be asked to enter the number of active devices and the number of spare devices which will form the MD. Next, you need to select from the list of available RAID partitions those that will be active and then those that will be spare. The count of selected partitions must be equal to the number provided earlier. Don't worry. If you make a mistake and select a different number of partitions, debian-installer won't let you continue until you correct the issue.

- RAID5 has a setup procedure similar to RAID1 with the exception that you need to use at least three active partitions.

- RAID6 also has a setup procedure similar to RAID1 except that at least four active partitions are required.

- RAID10 again has a setup procedure similar to RAID1 except in expert mode. In expert mode, debian-installer will ask you for the layout. The layout has two parts. The first part is the layout type. It is either n (for near copies), f (for far copies), or o (for offset copies). The second part is the number of copies to make of the data. There must be at least that many active devices so that all of the copies can be distributed onto different disks.

It is perfectly possible to have several types of MD at once. For example, if you have three 200 GB hard drives dedicated to MD, each containing two 100 GB partitions, you can combine the first partitions on all three disks into the RAID0 (fast 300 GB video editing partition) and use the other three partitions (2 active and 1 spare) for RAID1 (quite reliable 100 GB partition for /home).

按您的需要設定 MD 設備之後，您可以結束 partman-md 返回到 partman 去建立 MD 設備的檔案系統並分配掛載點。

6.3.4.5　Configuring the Logical Volume Manager (LVM)

如果您做電腦系統管理員工作或者"進階"使用者，您一定遇過磁碟分區 (經常是最重要的那個) 空間不足，同時其他的分割區卻不能平衡使用，然後您不得不被移動檔案或符號鏈結等方法所困擾。

To avoid the described situation you can use Logical Volume Manager (LVM). Simply said, with LVM you can combine your partitions (physical volumes in LVM lingo) to form a virtual disk (so called volume group), which can then be divided into virtual partitions (logical volumes). The point is that logical volumes (and of course underlying volume groups) can span across several physical disks.

Now when you realize you need more space for your old 160GB /home partition, you can simply add a new 300GB disk to the computer, join it with your existing volume group and then resize the logical volume which holds your /home filesystem and voila —your users have some room again on

their renewed 460GB partition. This example is of course a bit oversimplified. If you haven't read it yet, you should consult the LVM HOWTO.

LVM setup in `debian-installer` is quite simple and completely supported inside partman. First, you have to mark the partition(s) to be used as physical volumes for LVM. This is done in the Partition settings menu where you should select Use as: → physical volume for LVM.

> **警告**
>
> ⚠ Be aware: the new LVM setup will destroy all data on all partitions marked with an LVM type code. So, if you already have an LVM on some of your disks, and want to install Debian additionally to that machine, the old (already existing) LVM will be wiped out! The same counts for partitions, which are (for any reason) misleadingly marked with an LVM type code, but contain something different (like an encrypted volume). You need to remove such disks from the system, before performing a new LVM setup!

When you return to the main partman screen, you will see a new option Configure the Logical Volume Manager. When you select that, you will first be asked to confirm pending changes to the partition table (if any) and after that the LVM configuration menu will be shown. Above the menu a summary of the LVM configuration is shown. The menu itself is context sensitive and only shows valid actions. The possible actions are:

- Display configuration details: shows LVM device structure, names and sizes of logical volumes and more

- Create volume group

- Create logical volume

- Delete volume group

- Delete logical volume

- Extend volume group

- Reduce volume group

- Finish: return to the main partman screen

Use the options in that menu to first create a volume group and then create your logical volumes inside it.

After you return to the main partman screen, any created logical volumes will be displayed in the same way as ordinary partitions (and you should treat them as such).

6.3.4.6　Configuring Encrypted Volumes

`debian-installer` allows you to set up encrypted partitions. Every file you write to such a partition is immediately saved to the device in encrypted form. Access to the encrypted data is granted only after entering the passphrase used when the encrypted partition was originally created. This feature is useful to protect sensitive data in case your laptop or hard drive gets stolen. The thief might get physical access to the hard drive, but without knowing the right passphrase, the data on the hard drive will look like random characters.

The two most important partitions to encrypt are: the home partition, where your private data resides, and the swap partition, where sensitive data might be stored temporarily during operation. Of course, nothing prevents you from encrypting any other partitions that might be of interest. For example `/var` where database servers, mail servers or print servers store their data, or `/tmp` which is used by various programs to store potentially interesting temporary files. Some people may even want to encrypt their whole system. Generally the only exception here is the `/boot` partition which must remain unencrypted, because historically there was no way to load the kernel from an encrypted partition. (GRUB is now able to do that, but `debian-installer` currently lacks native support for encrypted `/boot`. The setup is therefore covered in a separate document.)

注

Please note that the performance of encrypted partitions will be less than that
of unencrypted ones because the data needs to be decrypted or encrypted for
every read or write. The performance impact depends on your CPU speed, cho-
sen cipher and a key length.

To use encryption, you have to create a new partition by selecting some free space in the main
partitioning menu. Another option is to choose an existing partition (e.g. a regular partition, an LVM
logical volume or a RAID volume). In the Partition settings menu, you need to select physical volume for
encryption at the Use as: option. The menu will then change to include several cryptographic options
for the partition.

The encryption method supported by `debian-installer` is dm-crypt (included in newer Linux
kernels, able to host LVM physical volumes).

Let's have a look at the options available when you select encryption via `Device-mapper (dm-crypt)`.
As always: when in doubt, use the defaults, because they have been carefully chosen with security in
mind.

Encryption: `aes`　This option lets you select the encryption algorithm (cipher) which will be used to
encrypt the data on the partition. `debian-installer` currently supports the following block
ciphers: aes, blowfish, serpent, and twofish. It is beyond the scope of this document to discuss
the qualities of these different algorithms, however, it might help your decision to know that in
2000, AES was chosen by the American National Institute of Standards and Technology as the
standard encryption algorithm for protecting sensitive information in the 21st century.

Key size: 256　Here you can specify the length of the encryption key. With a larger key size, the strength
of the encryption is generally improved. On the other hand, increasing the length of the key
usually has a negative impact on performance. Available key sizes vary depending on the cipher.

IV algorithm: `xts-plain64`　The Initialization Vector or IV algorithm is used in cryptography to ensure
that applying the cipher on the same clear text data with the same key always produces a unique
cipher text. The idea is to prevent the attacker from deducing information from repeated patterns
in the encrypted data.

From the provided alternatives, the default `xts-plain64` is currently the least vulnerable to
known attacks. Use the other alternatives only when you need to ensure compatibility with some
previously installed system that is not able to use newer algorithms.

Encryption key: `Passphrase`　Here you can choose the type of the encryption key for this partition.

Passphrase　The encryption key will be computed[5] on the basis of a passphrase which you will be
able to enter later in the process.

Random key　A new encryption key will be generated from random data each time you try to bring
up the encrypted partition. In other words: on every shutdown the content of the partition
will be lost as the key is deleted from memory. (Of course, you could try to guess the key
with a brute force attack, but unless there is an unknown weakness in the cipher algorithm,
it is not achievable in our lifetime.)

Random keys are useful for swap partitions because you do not need to bother yourself
with remembering the passphrase or wiping sensitive information from the swap partition
before shutting down your computer. However, it also means that you will not be able to use
the "suspend-to-disk" functionality offered by newer Linux kernels as it will be impossible
(during a subsequent boot) to recover the suspended data written to the swap partition.

Erase data: `yes`　Determines whether the content of this partition should be overwritten with random
data before setting up the encryption. This is recommended because it might otherwise be possi-
ble for an attacker to discern which parts of the partition are in use and which are not. In addition,
this will make it harder to recover any leftover data from previous installations[6].

---

[5]Using a passphrase as the key currently means that the partition will be set up using LUKS.

[6]It is believed that the guys from three-letter agencies can restore the data even after several rewrites of the magnetooptical
media, though.

After you have selected the desired parameters for your encrypted partitions, return back to the main partitioning menu. There should now be a new menu item called Configure encrypted volumes. After you select it, you will be asked to confirm the deletion of data on partitions marked to be erased and possibly other actions such as writing a new partition table. For large partitions this might take some time.

Next you will be asked to enter a passphrase for partitions configured to use one. Good passphrases should be longer than 8 characters, should be a mixture of letters, numbers and other characters and should not contain common dictionary words or information easily associable with you (such as birthdates, hobbies, pet names, names of family members or relatives, etc.).

警告

⚠

Before you input any passphrases, you should have made sure that your keyboard is configured correctly and generates the expected characters. If you are unsure, you can switch to the second virtual console and type some text at the prompt. This ensures that you won't be surprised later, e.g. by trying to input a passphrase using a qwerty keyboard layout when you used an azerty layout during the installation. This situation can have several causes. Maybe you switched to another keyboard layout during the installation, or the selected keyboard layout might not have been set up yet when entering the passphrase for the root file system.

If you selected to use methods other than a passphrase to create encryption keys, they will be generated now. Because the kernel may not have gathered a sufficient amount of entropy at this early stage of the installation, the process may take a long time. You can help speed up the process by generating entropy: e.g. by pressing random keys, or by switching to the shell on the second virtual console and generating some network and disk traffic (downloading some files, feeding big files into /dev/null, etc.). This will be repeated for each partition to be encrypted.

After returning to the main partitioning menu, you will see all encrypted volumes as additional partitions which can be configured in the same way as ordinary partitions. The following example shows a volume encrypted via dm-crypt.

```
Encrypted volume (sda2_crypt) - 115.1 GB Linux device-mapper
    #1 115.1 GB  F ext3
```

Now is the time to assign mount points to the volumes and optionally change the file system types if the defaults do not suit you.

Pay attention to the identifiers in parentheses (sda2_crypt in this case) and the mount points you assigned to each encrypted volume. You will need this information later when booting the new system. The differences between the ordinary boot process and the boot process with encryption involved will be covered later in 節 .

Once you are satisfied with the partitioning scheme, continue with the installation.

6.3.5　安裝基本系統

Although this stage is the least problematic, it consumes a significant fraction of the install because it downloads, verifies and unpacks the whole base system. If you have a slow computer or network connection, this could take some time.

During installation of the base system, package unpacking and setup messages are redirected to tty4. You can access this terminal by pressing Left Alt-F4; get back to the main installer process with Left Alt-F1.

The unpack/setup messages generated during this phase are also saved in /var/log/syslog. You can check them there if the installation is performed over a serial console.

作為安裝的一部分，Hurd 核心也會被安裝。在預設的優先等級下，安裝程式會選擇一個與您硬體最匹配的核心。在較低的優先級下，您可以從列表中選擇一個有效的核心。

When packages are installed using the package management system, it will by default also install packages that are recommended by those packages. Recommended packages are not strictly required for the core functionality of the selected software, but they do enhance that software and should, in

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the view of the package maintainers, normally be installed together with that software.

> 注
>
> For technical reasons packages installed during the installation of the base system are installed without their "Recommends". The rule described above only takes effect after this point in the installation process.

6.3.6 Installing Additional Software

At this point you have a usable but limited system. Most users will want to install additional software on the system to tune it to their needs, and the installer allows you do so. This step can take even longer than installing the base system if you have a slow computer or network connection.

6.3.6.1 Configuring apt

One of the tools used to install packages on a Debian GNU/Hurd system is the program apt, from the `apt` package[7]. Other front-ends for package management, like aptitude and synaptic, are also in use. These front-ends are recommended for new users, since they integrate some additional features (package searching and status checks) in a nice user interface.

apt must be configured so that it knows from where to retrieve packages. The results of this configuration are written to the file `/etc/apt/sources.list`. You can examine and edit this file to your liking after the installation is complete.

If you are installing at default priority, the installer will largely take care of the configuration automatically, based on the installation method you are using and possibly using choices made earlier in the installation. In most cases the installer will automatically add a security mirror and, if you are installing the stable distribution, a mirror for the "stable-updates" service.

If you are installing at a lower priority (e.g. in expert mode), you will be able to make more decisions yourself. You can choose whether or not to use the security and/or stable-updates services, and you can choose to add packages from the "contrib", "non-free", and "non-free-firmware" sections of the archive.

6.3.6.1.1 Installing from more than one DVD image

If you are installing from a DVD image that is part of a larger set, the installer will ask if you want to scan additional installation media. If you have such additional media available, you probably want to do this so the installer can use the packages included on them.

If you do not have any additional media, that is no problem: using them is not required. If you also do not use a network mirror (as explained in the next section), it can mean that not all packages belonging to the tasks you select in the next step of the installation can be installed.

---

[7]Note that the program which actually installs the packages is called dpkg. However, this program is more of a low-level tool. apt is a higher-level tool, which will invoke dpkg as appropriate. It knows how to retrieve packages from your installation media, the network, or wherever. It is also able to automatically install other packages which are required to make the package you're trying to install work correctly.

> **注**
>
> Packages are included on DVD images in the order of their popularity. This means that for most uses only the first image of a set is needed and that only very few people actually use any of the packages included on the last images of a set.
>
> It also means that buying or downloading and burning a full DVD set is just a waste of money as you'll never use most of them. In most cases you are better off getting only the first 1 to 2 DVDs and installing any additional packages you may need from the Internet by using a mirror.

If you do scan multiple installation media, the installer will prompt you to exchange them when it needs packages from one that isn't currently in the drive. Note that only discs that belong to the same set should be scanned. The order in which they are scanned does not really matter, but scanning them in ascending order will reduce the chance of mistakes.

6.3.6.1.2 Using a network mirror

One question that will be asked during most installs is whether or not to use a network mirror as a source for packages. In most cases the default answer should be fine, but there are some exceptions.

If you are not installing from a DVD image, you really should use a network mirror as otherwise you will end up with only a very minimal system. However, if you have a limited Internet connection it is best not to select the `desktop` task in the next step of the installation.

If you are installing from DVD, any packages needed during the installation should be present on the first DVD image. Use of a network mirror is optional.

One advantage of adding a network mirror is that updates, that have occurred since the DVD images were created and have been included in a point release, will become available for installation, thus extending the life of your DVD set without compromising the security or stability of the installed system.

In summary: selecting a network mirror is generally a good idea, except if you do not have a good Internet connection. If the current version of a package is available from installation media, the installer will always use that. The amount of data that will be downloaded if you do select a mirror thus depends on

1. the tasks you select in the next step of the installation,

2. which packages are needed for those tasks,

3. which of those packages are present on the installation media you have scanned, and

4. whether any updated versions of packages included on the installation media are available from a mirror (either a regular package mirror, or a mirror for security or stable-updates).

Note that the last point means that, even if you choose not to use a network mirror, some packages may still be downloaded from the Internet if there is a security or stable-updates update available for them and those services have been configured.

6.3.6.1.3 Choosing a network mirror

Unless you chose not to use a network mirror, you will be presented with a list of network mirrors based upon your country selection earlier in the installation process. Choosing the offered default is usually fine.

The offered default is deb.debian.org, which is not a mirror itself but will redirect to a mirror that should be up-to-date and fast. These mirrors support TLS (https protocol) and IPv6. This service is maintained by the Debian System Administration (DSA) team.

A mirror can also be specified by hand by choosing "enter information manually". You can then specify a mirror host name and an optional port number. This actually has to be a URL base, i.e. when specifying an IPv6 address, one has to add square brackets around it, for instance "[2001:db8::1]".

If your computer is on an IPv6-only network (which is probably not the case for the vast majority of users), using the default mirror for your country might not work. All the mirrors in the list are

reachable via IPv4, but only some of them can be used via IPv6. As connectivity of individual mirrors can change over time, this information is not available in the installer. If there is no IPv6 connectivity for the default mirror for your country, you can either try some of the other mirrors offered to you or choose the "enter information manually" option. You can then specify "ftp.ipv6.debian.org" as the mirror name, which is an alias for a mirror available via IPv6, although it will probably not be the fastest possible one.

6.3.6.2 Selecting and Installing Software

During the installation process, you are given the opportunity to select additional software to install. Rather than picking individual software packages from the available packages, this stage of the installation process focuses on selecting and installing predefined collections of software to quickly set up your computer to perform various tasks.

These tasks loosely represent a number of different jobs or things you want to do with your computer, such as "Desktop environment", "Web server", or "SSH server" [8]. 節 D.1 lists the space requirements for the available tasks.

Some tasks may be pre-selected based on the characteristics of the computer you are installing. If you disagree with these selections you can deselect them. You can even opt to install no tasks at all at this point.

提示

☞ In the standard user interface of the installer, you can use the space bar to toggle selection of a task.

注

✎ The "Desktop environment" task will install a graphical desktop environment.

By default, `debian-installer` installs the desktop environment. It is possible to interactively select a different desktop environment during the installation. It is also possible to install multiple desktops, but some combinations of desktop may not be co-installable.

Note that this will only work if the packages needed for the desired desktop environment are actually available. Installing any of the available desktop environments this way should work fine if you are using a DVD image or any other installation method with a network mirror.

The various server tasks will install software roughly as follows. Web server: `apache2`; SSH server: `openssh`.

The "Standard system utilities" task will install any package that has a priority "standard". This includes a lot of common utilities that are normally available on any Linux or Unix system. You should leave this task selected unless you know what you are doing and want a really minimal system.

If during language selection a default locale other than the "C" locale was selected, tasksel will check if any localization tasks are defined for that locale and will automatically try to install relevant localization packages. This includes for example packages containing word lists or special fonts for your language. If a desktop environment was selected, it will also install appropriate localization packages for that (if available).

Once you've selected your tasks, select Continue. At this point, apt will install the packages that are part of the selected tasks. If a particular program needs more information from the user, it will

---

[8]You should know that to present this list, the installer is merely invoking the tasksel program. It can be run at any time after installation to install more packages (or remove them), or you can use a more fine-grained tool such as aptitude. If you are looking for a specific single package, after installation is complete, simply run `aptitude install package`, where `package` is the name of the package you are looking for.

---

prompt you during this process.

You should be aware that especially the Desktop task is very large. Especially when installing from a netinst CD image in combination with a mirror for packages not on the netinst, the installer may want to retrieve a lot of packages over the network. If you have a relatively slow Internet connection, this can take a long time. There is no option to cancel the installation of packages once it has started.

Even when packages are included on the installation image, the installer may still retrieve them from the mirror if the version available on the mirror is more recent than the one included on the image. If you are installing the stable distribution, this can happen after a point release (an update of the original stable release); if you are installing the testing distribution this will happen if you are using an older image.

6.3.7 使系統可開機

6.3.7.1 偵測其他的作業系統

在啟動開機器安裝之前，安裝程式會試著偵測已經安裝到電腦上的其他作業系統。如果它找到支援的作業系統，您將在啟動開機器安裝步驟裡得到提示，與 Debian 一起，電腦也將設定為可以啟動其他作業系統。

注意，從單機上啟動多個作業系統仍然是種魔術。自動偵測和設定 boot-loader 啟動其他作業系統的功能會依硬體架構甚至是子架構而不同。如果它不能運作，您應該參考 boot-loader 的文件以瞭解更多資訊。

6.3.7.2 Install the Grub Boot Loader on the drive

The hurd-amd64 boot loader is called "grub". Grub is a flexible and robust boot loader and a good default choice for new users and old hands alike.

By default, grub will be installed on the UEFI partition/the Boot Record of the primary drive, where it will take over complete control of the boot process. If you prefer, you can install it elsewhere. See the grub manual for complete information.

If you do not want to install grub, use the Go Back button to get to the main menu, and from there select whatever bootloader you would like to use.

6.3.7.3 不使用 boot-loader 繼續進行

該選項用於完成安裝而不安裝 boot-loader，這種情況可能是硬體架構/子架構不支援，或是因為不想要(例如，您想使用已經存在的 boot-loader)。

如果您打算手動設定 boot-loader，您需要檢查安裝在 /target/boot 的核心名稱。您還需要檢查 initrd 存在的目錄；如果存在，也許需要指定 bootloader 使用它。其相關資訊包括為 / 檔案系統選擇磁碟和分割區，並且，如果您打算安裝 /boot 到一個獨立的分割區，還需要 /boot 檔案系統。

6.3.8 Finishing the Installation

This is the last step in the Debian installation process during which the installer will do any last minute tasks. It mostly consists of tidying up after the `debian-installer`.

6.3.8.1 Setting the System Clock

The installer may ask you if the computer's clock is set to UTC. Normally this question is avoided if possible and the installer tries to work out whether the clock is set to UTC based on things like what other operating systems are installed.

In expert mode you will always be able to choose whether or not the clock is set to UTC. Systems that (also) run Windows are normally set to local time. If you want to dual-boot, select local time instead of UTC.

At this point `debian-installer` will also attempt to save the current time to the system's hardware clock. This will be done either in UTC or local time, depending on the selection that was just made.

6.3.8.2 Reboot the System

You will be prompted to remove the boot media (CD, USB stick, etc) that you used to boot the installer. After that the system will be rebooted into your new Debian system.

6.3.9 Troubleshooting

這裡的元件通常不在安裝程序之內，但會背景待命，以幫助使用者遇到麻煩時處理問題。

6.3.9.1 保存安裝記錄

If the installation is successful, the logfiles created during the installation process will be automatically saved to `/var/log/installer/` on your new Debian system.

Choosing Save debug logs from the main menu allows you to save the log files to a USB stick, network, hard disk, or other media. This can be useful if you encounter fatal problems during the installation and wish to study the logs on another system or attach them to an installation report.

6.3.9.2 使用 Shell 查看記錄

There are several methods you can use to get a shell while running an installation. On most systems, and if you are not installing over serial console, the easiest method is to switch to the second virtual console by pressing Left Alt-F2[9] (on a Mac keyboard, Option-F2). Use Left Alt-F1 to switch back to the installer itself.

If you cannot switch consoles, there is also an Execute a Shell item on the main menu that can be used to start a shell. You can get to the main menu from most dialogs by using the Go Back button one or more times. Type `exit` to close the shell and return to the installer.

At this point you are booted from the RAM disk, and there is a limited set of Unix utilities available for your use. You can see what programs are available with the command ls /bin /sbin /usr/bin /usr/sbin and by typing help. The shell is a Bourne shell clone called ash and has some nice features like autocompletion and history.

To edit and view files, use the text editor nano. Log files for the installation system can be found in the `/var/log` directory.

> 注
>
> Although you can do basically anything in a shell that the available commands allow you to do, the option to use a shell is really only there in case something goes wrong and for debugging.
>
> Doing things manually from the shell may interfere with the installation process and result in errors or an incomplete installation. In particular, you should always use let the installer activate your swap partition and not do this yourself from a shell.

6.3.10 Installation over network-console

One of the more interesting components is network-console. It allows you to do a large part of the installation over the network via SSH. The use of the network implies you will have to perform the first steps of the installation from the console, at least to the point of setting up the networking. (Although you can automate that part with 節 4.4.)

This component is not loaded into the main installation menu by default, so you have to explicitly ask for it. If you are installing from optical media, you need to boot with medium priority or otherwise invoke the main installation menu and choose Load installer components from installation media and from the list of additional components select network-console: Continue installation remotely using SSH. Successful load is indicated by a new menu entry called Continue installation remotely using SSH.

---

[9]That is: press the Alt key on the left-hand side of the space bar and the F2 function key at the same time.

After selecting this new entry, you will be asked for a new password to be used for connecting to the installation system and for its confirmation. That's all. Now you should see a screen which instructs you to login remotely as the user installer with the password you just provided. Another important detail to notice on this screen is the fingerprint of this system. You need to transfer the fingerprint securely to the person who will continue the installation remotely.

Should you decide to continue with the installation locally, you can always press Enter, which will bring you back to the main menu, where you can select another component.

Now let's switch to the other side of the wire. As a prerequisite, you need to configure your terminal for UTF-8 encoding, because that is what the installation system uses. If you do not, remote installation will be still possible, but you may encounter strange display artefacts like destroyed dialog borders or unreadable non-ascii characters. Establishing a connection with the installation system is as simple as typing:

```
$ ssh -l installer install_host
```

Where `install_host` is either the name or IP address of the computer being installed. Before the actual login the fingerprint of the remote system will be displayed and you will have to confirm that it is correct.

注

The ssh server in the installer uses a default configuration that does not send keep-alive packets. In principle, a connection to the system being installed should be kept open indefinitely. However, in some situations —depending on your local network setup —the connection may be lost after some period of inactivity. One common case where this can happen is when there is some form of Network Address Translation (NAT) somewhere between the client and the system being installed. Depending on at which point of the installation the connection was lost, you may or may not be able to resume the installation after reconnecting.

You may be able to avoid the connection being dropped by adding the option `-o ServerAliveInterval=value` when starting the ssh connection, or by adding that option in your ssh configuration file. Note however that in some cases adding this option may also cause a connection to be dropped (for example if keep-alive packets are sent during a brief network outage, from which ssh would otherwise have recovered), so it should only be used when needed.

注

If you install several computers in turn and they happen to have the same IP address or hostname, ssh will refuse to connect to such host. The reason is that it will have different fingerprint, which is usually a sign of a spoofing attack. If you are sure this is not the case, you will need to delete the relevant line from `~/.ssh/known_hosts`[a] and try again.

---
[a]The following command will remove an existing entry for a host: ssh-keygen -R `<hostname|IP address>`.

After the login you will be presented with an initial screen where you have two possibilities called Start menu and Start shell. The former brings you to the main installer menu, where you can continue with the installation as usual. The latter starts a shell from which you can examine and possibly fix the remote system. You should only start one SSH session for the installation menu, but may start multiple sessions for shells.

> **警告**
>
> ⚠ After you have started the installation remotely over SSH, you should not go back
> to the installation session running on the local console. Doing so may corrupt
> the database that holds the configuration of the new system. This in turn may
> result in a failed installation or problems with the installed system.

6.4 Loading Missing Firmware

As described in 節 2.2, some devices require firmware to be loaded. In most cases the device will not work at all if the firmware is not available; sometimes basic functionality is not impaired if it is missing and the firmware is only needed to enable additional features.

Starting with Debian GNU/Hurd 12.0, following the 2022 General Resolution about non-free firmware, official installation images (like netinst) can include non-free firmware packages. Even with those firmware packages available, some firmware files might still be missing. Or one might be using netboot files, which don't include firmware packages.

If a device driver requests firmware that is not available, `debian-installer` will display a dialog offering to load the missing firmware. If this option is selected, `debian-installer` will scan available devices for either loose firmware files or packages containing firmware. If found, the firmware will be copied to the correct location (`/lib/firmware`) and the driver module will be reloaded.

> **注**
>
> ✎ Which devices are scanned and which file systems are supported depends on
> the architecture, the installation method and the stage of the installation. Es-
> pecially during the early stages of the installation, loading the firmware is most
> likely to succeed from a FAT-formatted USB stick.

Note that it is possible to skip loading the firmware if you know the device will also function without it, or if the device is not needed during the installation.

6.4.1 Preparing a medium

The most common method to load such firmware is from some removable medium such as a USB stick. To prepare a USB stick (or other medium like a hard drive partition), the firmware files or packages must be placed in either the root directory or a directory named `/firmware` of the file system on the medium. The recommended file system to use is FAT as that is most certain to be supported during the early stages of the installation.

Tarballs and zip files containing current packages for the most common firmware, and the associated metadata to ensure a proper detection by the installer (dep11 directory), are available from:

- `https://cdimage.debian.org/cdimage/firmware/trixie/`

Just download the tarball or zip file for the correct release and unpack it to the file system on the medium.

It is also possible to copy individual firmware files to the medium. Loose firmware could be obtained for example from an already installed system or from a hardware vendor.

6.4.2 Firmware and the Installed System

Any firmware loaded during the installation will be copied automatically to the installed system. In most cases this will ensure that the device that requires the firmware will also work correctly after the system is rebooted into the installed system. However, if the installed system runs a different kernel version than the installer, there is a slight chance that the firmware cannot be loaded due to version skew.

If the firmware was loaded from a firmware package, `debian-installer` will also install this package for the installed system and will automatically add the non-free-firmware section of the package archive in APT's `sources.list`. This has the advantage that the firmware should be updated automatically if a new version becomes available.

If loading the firmware was skipped during the installation, the relevant device will probably not work with the installed system until the firmware (package) is installed manually.

注

> If the firmware was loaded from loose firmware files, the firmware copied to the installed system will not be automatically updated unless the corresponding firmware package (if available) is installed after the installation is completed.

6.4.3 Completing the Installed System

Depending on how the installation was performed, it might be that the need for some firmware was not detected during installation, that the relevant firmware was not available, or that one chose not to install some firmware at that time. In some cases, a successful installation can still end up in a black screen or a garbled display when rebooting into the installed system. When that happens, the following workarounds can be tried:

- Pass the `nomodeset` option on the kernel command line. This might help boot into a "fallback graphics" mode.

- Use the Ctrl-Alt-F2 key combination to switch to VT2, which might offer a functional login prompt.

6.5 Customization

Using the shell (see 節 6.3.9.2), the installation process can be carefully customized, to fit exceptional use cases:

6.5.1 Installing an alternative init system

Debian uses systemd as its default init system. However, other init systems (such as sysvinit and OpenRC) are supported, and the easiest time to select an alternative init system is during the installation process. For detailed instructions on how to do so, please see the Init page on the Debian wiki.

Chapter 7

啟動新 Debian 系統

7.1 關鍵時刻

當您的系統首次自行啟動，這在電子工程師圈子裡面稱為"冒煙測試"。

If you did a default installation, the first thing you should see when you boot the system is the menu of the `grub` bootloader. The first choices in the menu will be for your new Debian system. If you had any other operating systems on your computer (like Windows) that were detected by the installation system, those will be listed lower down in the menu.

If the system fails to start up correctly, don't panic. If the installation was successful, chances are good that there is only a relatively minor problem that is preventing the system from booting Debian. In most cases such problems can be fixed without having to repeat the installation. One available option to fix boot problems is to use the installer's built-in rescue mode (see 節 8.5).

If you are new to Debian and Hurd, you may need some help from more experienced users. For less common architectures like 64-bit PC, your best option is to ask on the debian-hurd mailing list. You can also file an installation report as described in 節 5.4.5. Please make sure that you describe your problem clearly and include any messages that are displayed and may help others to diagnose the issue.

If you had any other operating systems on your computer that were not detected or not detected correctly, please file an installation report.

7.2 Mounting encrypted volumes

If you created encrypted volumes during the installation and assigned them mount points, you will be asked to enter the passphrase for each of these volumes during the boot.

For partitions encrypted using dm-crypt you will be shown the following prompt during the boot:

```
Starting early crypto disks... part_crypt(starting)
Enter LUKS passphrase:
```

In the first line of the prompt, `part` is the name of the underlying partition, e.g. sda2 or md0. You are now probably wondering for which volume you are actually entering the passphrase. Does it relate to your /home? Or to /var? Of course, if you have just one encrypted volume, this is easy and you can just enter the passphrase you used when setting up this volume. If you set up more than one encrypted volume during the installation, the notes you wrote down as the last step in 節 6.3.4.6 come in handy. If you did not make a note of the mapping between `part_crypt` and the mount points before, you can still find it in /etc/crypttab and /etc/fstab of your new system.

The prompt may look somewhat different when an encrypted root file system is mounted. This depends on which initramfs generator was used to generate the initrd used to boot the system. The example below is for an initrd generated using `initramfs-tools`:

```
Begin: Mounting root file system... ...
Begin: Running /scripts/local-top ...
Enter LUKS passphrase:
```

No characters (even asterisks) will be shown while entering the passphrase. If you enter the wrong passphrase, you have two more tries to correct it. After the third try the boot process will skip this volume and continue to mount the next filesystem. Please see 節 7.2.1 for further information.

After entering all passphrases the boot should continue as usual.

7.2.1 Troubleshooting

If some of the encrypted volumes could not be mounted because a wrong passphrase was entered, you will have to mount them manually after the boot. There are several cases.

- The first case concerns the root partition. When it is not mounted correctly, the boot process will halt and you will have to reboot the computer to try again.

- The easiest case is for encrypted volumes holding data like /home or /srv. You can simply mount them manually after the boot.

  However for dm-crypt this is a bit tricky. First you need to register the volumes with device mapper by running:

  ```
  # /etc/init.d/cryptdisks start
  ```

  This will scan all volumes mentioned in /etc/crypttab and will create appropriate devices under the /dev directory after entering the correct passphrases. (Already registered volumes will be skipped, so you can repeat this command several times without worrying.) After successful registration you can simply mount the volumes the usual way:

  ```
  # mount /mount_point
  ```

- If any volume holding noncritical system files could not be mounted (/usr or /var), the system should still boot and you should be able to mount the volumes manually like in the previous case. However, you will also need to (re)start any services usually running in your default runlevel because it is very likely that they were not started. The easiest way is to just reboot the computer.

7.3 登入

Once your system boots, you'll be presented with the login prompt. Log in using the personal login and password you selected during the installation process. Your system is now ready for use.

如果您是新使用者，您也許希望瀏覽已經安裝到系統上的文件。目前有多個文件系統，由不同類型的文件組成。接下來將做簡略介紹。

Documentation accompanying programs you have installed can be found in /usr/share/doc/, under a subdirectory named after the program (or, more precise, the Debian package that contains the program). However, more extensive documentation is often packaged separately in special documentation packages that are mostly not installed by default. For example, documentation about the package management tool apt can be found in the packages apt-doc or apt-howto.

In addition, there are some special folders within the /usr/share/doc/ hierarchy. Linux HOW-TOs are installed in .gz (compressed) format, in /usr/share/doc/HOWTO/en-txt/. After installing dhelp, you will find a browsable index of documentation in /usr/share/doc/HTML/index.html.

One easy way to view these documents using a text based browser is to enter the following commands:

```
$ cd /usr/share/doc/
$ w3m .
```

The dot after the w3m command tells it to show the contents of the current directory.

If you have a graphical desktop environment installed, you can also use its web browser. Start the web browser from the application menu and enter /usr/share/doc/ in the address bar.

You can also type info command or man command to see documentation on most commands available at the command prompt. Typing help will display help on shell commands. And typing a command followed by --help will usually display a short summary of the command's usage. If a command's results scroll past the top of the screen, type | more after the command to cause the results to pause before scrolling past the top of the screen. To see a list of all commands available which begin with a certain letter, type the letter and then two tabs.

Chapter 8

下一步該做什麼

8.1 Shutting down the system

To shut down a running Debian GNU/Hurd system, you must not reboot with the reset switch on the front or back of your computer, or just turn off the computer. Debian GNU/Hurd should be shut down in a controlled manner, otherwise files might get lost and/or disk damage might occur. If you run a desktop environment, there is usually an option to "log out" available from the application menu that allows you to shutdown (or reboot) the system.

Alternatively you can press the key combination Ctrl-Alt-Del . If the key combinations do not work, a last option is to log in as root and type the necessary commands. Use reboot to reboot the system. Use halt to halt the system without powering it off [1]. To power off the machine, use poweroff or shutdown -h now. The systemd init system provides additional commands that perform the same functions; for example systemctl reboot or systemctl poweroff.

8.2 讓您自己轉向 Debian

Debian 和其它的發行版有些不同。即使您熟悉其它發行版的 Linux，您也應該瞭解 Debian 的一些東西，以便保持您的系統處在整潔良好的狀態。本章包含的內容可以幫助您瞭解 Debian；但這並不是一個如何使用 Debian 的入門指南，而僅僅是對整個系統的一個粗略的介紹。

8.2.1 Debian 軟體套件系統

要掌握的最重要概念是 Debian 的軟體套件系統。事實上，您系統的絕大部分都該由軟體套件系統來控制。包括：

- /usr (除了 /usr/local 之外)

- /var (您可以建立 /var/local，在那裡面進行安全的操作)

- /bin

- /sbin

- /lib

例如，如果您替換了 /usr/bin/perl，它可以正常工作，但以後您升級了 perl 軟體套件，那個檔案仍將被替換回來。有經驗的使用者可以將軟體套件設置為 "hold" 狀態，以避免這種情況，這需要使用 aptitude。

One of the best installation methods is apt. You can use the command line version of apt as well as tools like aptitude or synaptic (which are just graphical frontends for apt). Note that apt will also let you merge main, contrib, non-free, and non-free-firmware so you can have restricted packages (strictly speaking not belonging to Debian) as well as packages from Debian GNU/Hurd at the same time.

---

[1] Under the SysV init system halt had the same effect as poweroff, but with systemd as init system (the default since jessie) their effects are different.

8.2.2　Additional Software Available for Debian

There are official and unofficial software repositories that are not enabled in the default Debian install. These contain software which many find important and expect to have. Information on these additional repositories can be found on the Debian Wiki page titled The Software Available for Debian's Stable Release.

8.2.3　應用程式版本管理

可選版本的應用程式可以透過 update-alternatives 來管理。如果您維護著多個版本的應用程式，請參閱 update-alternatives 的 man 手冊。

8.2.4　任務排程管理

Any jobs under the purview of the system administrator should be in `/etc`, since they are configuration files. If you have a root cron job for daily, weekly, or monthly runs, put them in `/etc/cron.{daily, weekly,monthly}`. These are invoked from `/etc/crontab`, and will run in alphabetic order, which serializes them.

On the other hand, if you have a cron job that (a) needs to run as a special user, or (b) needs to run at a special time or frequency, you can use either `/etc/crontab`, or, better yet, `/etc/cron.d/whatever`. These particular files also have an extra field that allows you to stipulate the user account under which the cron job runs.

在任何情況下，您只需編輯這些檔案，cron 將會自動處理它們。沒有必要再執行某個特殊的指令。欲瞭解更多的資訊，請參閱 cron(8)，crontab(5)，以及 `/usr/share/doc/cron/README.Debian`。

8.3　更多閱讀資訊

The Debian web site contains a large quantity of documentation about Debian. In particular, see the Debian GNU/Linux FAQ and the Debian Reference. An index of more Debian documentation is available from the Debian Documentation Project. The Debian community is self-supporting; to subscribe to one or more of the Debian mailing lists, see the Mail List Subscription page. Last, but not least, the Debian Mailing List Archives contain a wealth of information on Debian.

如果您想查閱某個程式的更詳細資料，應該先試試 man 程式名稱，或者 info 程式名稱。

在 `/usr/share/doc` 目錄裡有很多有用的文件，特別是 `/usr/share/doc/HOWTO` 和 `/usr/share/doc/FAQ` 裡有很多值得一讀的文章。如果您想回報臭蟲報告，請先查閱這些文件：`/usr/share/doc/debian/bug*`。針對某個程式，其有關於 Debian 的內容可以查閱文件：`/usr/share/doc/(package name)/README.Debian`。

8.4　Setting Up Your System To Use E-Mail

Today, email is an important part of many people's life. As there are many options as to how to set it up, and as having it set up correctly is important for some Debian utilities, we will try to cover the basics in this section.

There are three main functions that make up an e-mail system. First there is the Mail User Agent (MUA) which is the program a user actually uses to compose and read mails. Then there is the Mail Transfer Agent (MTA) that takes care of transferring messages from one computer to another. And last there is the Mail Delivery Agent (MDA) that takes care of delivering incoming mail to the user's inbox.

These three functions can be performed by separate programs, but they can also be combined in one or two programs. It is also possible to have different programs handle these functions for different types of mail.

On Linux and Unix systems mutt is historically a very popular MUA. Like most traditional Linux programs it is text based. It is often used in combination with exim or sendmail as MTA and procmail as MDA.

With the increasing popularity of graphical desktop systems, the use of graphical e-mail programs like GNOME's evolution, KDE's kmail or Mozilla's thunderbird has becoming more popular. These

programs combine the function of a MUA, MTA and MDA, but can —and often are —also be used in combination with the traditional Linux tools.

8.4.1 Default E-Mail Configuration

Even if you are planning to use a graphical mail program, it would be useful, to have a traditional MTA/MDA installed and correctly set up on your Debian GNU/Hurd system. Reason is that various utilities running on the system[2] can send important notices by e-mail to inform the system administrator of (potential) problems or changes.

For this you can install `exim4` and `mutt` with apt install exim4 mutt. `exim4` is a combination MTA/MDA that is relatively small but very flexible. By default it will be configured to only handle e-mail local to the system itself and e-mails addressed to the system administrator (root account) will be delivered to the regular user account created during the installation[3].

When system e-mails are delivered they are added to a file in `/var/mail/account_name`. The e-mails can be read using mutt.

8.4.2 Sending E-Mails Outside The System

As mentioned earlier, the installed Debian system is only set up to handle e-mail local to the system, not for sending mail to others nor for receiving mail from others.

If you would like `exim4` to handle external e-mail, please refer to the next subsection for the basic available configuration options. Make sure to test that mail can be sent and received correctly.

If you intend to use a graphical mail program and use a mail server of your Internet Service Provider (ISP) or your company, there is not really any need to configure `exim4` for handling external e-mail. Just configure your favorite graphical mail program to use the correct servers to send and receive e-mail (how is outside the scope of this manual).

However, in that case you may need to configure individual utilities to correctly send e-mails. One such utility is reportbug, a program that facilitates submitting bug reports against Debian packages. By default it expects to be able to use `exim4` to submit bug reports.

To correctly set up reportbug to use an external mail server, please run the command reportbug --configure and answer "no" to the question if an MTA is available. You will then be asked for the SMTP server to be used for submitting bug reports.

8.4.3 Configuring the Exim4 Mail Transport Agent

If you would like your system to also handle external e-mail, you will need to reconfigure the `exim4` package[4]:

```
# dpkg-reconfigure exim4-config
```

After entering that command (as root), you will be asked if you want split the configuration into small files. If you are unsure, select the default option.

Next you will be presented with several common mail scenarios. Choose the one that most closely resembles your needs.

網際網路站 您的系統連接到網路上,並且您透過 SMTP 直接收發郵件。在接下來的幾頁中,程式會詢問您一些基本問題,如:您的機器的郵件名稱、您接受或轉發郵件的網域名稱等等。

用 smarthost 發信 In this scenario your outgoing mail is forwarded to another machine, called a "smarthost", which takes care of sending the message on to its destination. The smarthost also usually stores incoming mail addressed to your computer, so you don't need to be permanently online. That also means you have to download your mail from the smarthost via programs like fetchmail.

In a lot of cases the smarthost will be your ISP's mail server, which makes this option very suitable for dial-up users. It can also be a company mail server, or even another system on your own network.

---

[2]Examples are: cron, quota, logcheck, aide, ⋯

[3]The forwarding of mail for root to the regular user account is configured in `/etc/aliases`. If no regular user account was created, the mail will of course be delivered to the root account itself.

[4]You can of course also remove `exim4` and replace it with an alternative MTA/MDA.

mail sent by smarthost; no local mail This option is basically the same as the previous one except that the system will not be set up to handle mail for a local e-mail domain. Mail on the system itself (e.g. for the system administrator) will still be handled.

僅在本地發送 This is the option your system is configured for by default.

現在不進行設定 除非您真的知道您在做什麼，否則請不要選擇這一選項。這會留下一個未設定的郵件系統—在您再次設定它之前，您都無法收發任何郵件，並且可能會錯過一些系統工具發出的重要資訊。

If none of these scenarios suits your needs, or if you need a finer grained setup, you will need to edit configuration files under the `/etc/exim4` directory after the installation is complete. More information about exim4 may be found under `/usr/share/doc/exim4`; the file `README.Debian.gz` has further details about configuring exim4 and explains where to find additional documentation.

Note that sending mail directly to the Internet when you don＇t have an official domain name, can result in your mail being rejected because of anti-spam measures on receiving servers. Using your ISP＇s mail server is preferred. If you still do want to send out mail directly, you may want to use a different e-mail address than is generated by default. If you use exim4 as your MTA, this is possible by adding an entry in `/etc/email-addresses`.

8.5　Recovering a Broken System

Sometimes, things go wrong, and the system you＇ve carefully installed is no longer bootable. Perhaps the boot loader configuration broke while trying out a change, or perhaps a new kernel you installed won＇t boot, or perhaps cosmic rays hit your disk and flipped a bit in `/sbin/init`. Regardless of the cause, you＇ll need to have a system to work from while you fix it, and rescue mode can be useful for this.

To access rescue mode, select `rescue` from the boot menu, type `rescue` at the `boot:` prompt, or boot with the `rescue/enable=true` boot parameter. You＇ll be shown the first few screens of the installer, with a note in the corner of the display to indicate that this is rescue mode, not a full installation. Don＇t worry, your system is not about to be overwritten! Rescue mode simply takes advantage of the hardware detection facilities available in the installer to ensure that your disks, network devices, and so on are available to you while repairing your system.

Instead of the partitioning tool, you should now be presented with a list of the partitions on your system, and asked to select one of them. Normally, you should select the partition containing the root file system that you need to repair. You may select partitions on RAID and LVM devices as well as those created directly on disks.

If possible, the installer will now present you with a shell prompt in the file system you selected, which you can use to perform any necessary repairs. For example, if you need to reinstall the GRUB boot loader into the master boot record of the first hard disk, you could enter the command `grub-install ＇(hd0)＇` to do so.

If the installer cannot run a usable shell in the root file system you selected, perhaps because the file system is corrupt, then it will issue a warning and offer to give you a shell in the installer environment instead. You may not have as many tools available in this environment, but they will often be enough to repair your system anyway. The root file system you selected will be mounted on the `/target` directory.

In either case, after you exit the shell, the system will reboot.

Finally, note that repairing broken systems can be difficult, and this manual does not attempt to go into all the things that might have gone wrong or how to fix them. If you have problems, consult an expert.

Appendix A

安裝 Howto

This document describes how to install Debian GNU/Hurd trixie for the 64-bit PC（"hurd-amd64"）with the new `debian-installer`. It is a quick walkthrough of the installation process which should contain all the information you will need for most installs. When more information can be useful, we will link to more detailed explanations in other parts of this document.

A.1 前言

If you encounter bugs during your install, please refer to 節 5.4.5 for instructions on how to report them. If you have questions which cannot be answered by this document, please direct them to the debian-boot mailing list (debian-boot@lists.debian.org) or ask on IRC (#debian-boot on the OFTC network).

A.2 啟動安裝程式

For some quick links to installation images, check out the `debian-installer` home page. The debian-cd team provides builds of installation images using `debian-installer` on the Debian CD/DVD page. For more information on where to get installation images, see 節 4.1.

Some installation methods require other images than those for optical media. The `debian-installer` home page has links to other images. 節 4.2.1 explains how to find images on Debian mirrors.

下一節我們就各種可能的安裝方法，仔細解釋如何取得所需的映像檔。

A.2.1 Optical disc

The netinst CD image is a popular image which can be used to install trixie with the `debian-installer`. This installation method is intended to boot from the image and install additional packages over a network; hence the name "netinst". The image has the software components needed to run the installer and the base packages to provide a minimal trixie system. If you'd rather, you can get a DVD image which will not need the network to install. You only need the first image of such set.

Download whichever type you prefer and burn it to an optical disc. To boot the disc, you may need to change your BIOS/UEFI configuration, as explained in 節 3.6.1.

A.2.2 透過網路開機

要完全從網路上啟動 (即 netboot) debian-installer 也是可行的。而採取哪種方法來從網路啟動取決於您的硬體架構和網路啟動的相關設定。在 netboot/ 目錄裡的檔案是用來從網路啟動 debian-installer。

A.3 安裝

Once the installer starts, you will be greeted with an initial screen. Press Enter to boot, or read the instructions for other boot methods and parameters (see 節 5.3).

接下來畫面要求您選擇欲使用的語言。利用上下鍵來選擇語言，然後按 Enter 以繼續下面的步驟。接下來，您要選擇您的國家，選項裡包括了那些使用您所選語言的國家。如果在列表中找不到您要找的國家，還有一個包含世界上所有國家的列表以供選擇。

您還可能被要求確認一下您的鍵盤排列方式。選擇預設的那個方式，或是選擇更合適的一個。

Now sit back while debian-installer detects some of your hardware, and loads the rest of the installation image.

接下來，安裝程式會嘗試偵測網路相關硬體，透過 DHCP 完成網路的設定。如果電腦沒有連接網路，或是沒有用 DHCP，那麼您也可以手動設定網路。

Setting up the network is followed by the creation of user accounts. By default you are asked to provide a password for the "root" (administrator) account and information necessary to create one regular user account. If you do not specify a password for the "root" user, this account will be disabled but the sudo package will be installed later to enable administrative tasks to be carried out on the new system. By default, the first user created on the system will be allowed to use the sudo command to become root.

The next step is setting up your clock and time zone. The installer will try to contact a time server on the Internet to ensure the clock is set correctly. The time zone is based on the country selected earlier and the installer will only ask to select one if a country has multiple zones.

Now it is time to partition your disks. First you will be given the opportunity to automatically partition either an entire drive, or available free space on a drive (see 節 6.3.4.2). This is recommended for new users or anyone in a hurry. If you do not want to autopartition, choose Manual from the menu.

If you have an existing Windows partition that you want to preserve, be very careful with automatic partitioning. If you choose manual partitioning, you can use the installer to resize existing FAT or NTFS partitions to create room for the Debian install: simply select the partition and specify its new size.

On the next screen you will see your partition table, how the partitions will be formatted, and where they will be mounted. Select a partition to modify or delete it. If you did automatic partitioning, you should just be able to choose Finish partitioning and write changes to disk from the menu to use what it set up. Remember to assign at least one partition for swap space and to mount a partition on /. For more detailed information on how to use the partitioner, please refer to 節 6.3.4; the appendix 附錄 C has more general information about partitioning.

現在 debian-installer 會先把您的磁區格式化，然後安裝基本系統，這兩步會花些時間。接著它會安裝核心。

The base system that was installed earlier is a working, but very minimal installation. To make the system more functional the next step allows you to install additional packages by selecting tasks. Before packages can be installed apt needs to be configured as that defines from where the packages will be retrieved. The "Standard system utilities" task will be selected by default and should normally be installed. Select the "Desktop environment" task if you would like to have a graphical desktop after the installation. See 節 6.3.6.2 for additional information about this step.

The last step is to install a boot loader. If the installer detects other operating systems on your computer, it will add them to the boot menu and let you know. By default GRUB will be installed to the UEFI partition/boot record of the primary drive, which is generally a good choice. You'll be given the opportunity to override that choice and install it elsewhere.

debian-installer will now tell you that the installation has finished. Remove the cdrom or other boot media and hit Enter to reboot your machine. It should boot up into the newly installed system and allow you to log in. This is explained in 章 7.

如果您想要更多的安裝過程相關資訊，請看章 6。

A.4 請寄給我們一份安裝報告

If you successfully managed an installation with debian-installer, please take time to provide us with a report. The simplest way to do so is to install the reportbug package (apt install reportbug), configure reportbug as explained in 節 8.4.2, and run reportbug installation-reports.

If you did not complete the install, you probably found a bug in debian-installer. To improve the installer it is necessary that we know about them, so please take the time to report them. You can use

an installation report to report problems; if the install completely fails, see 節 5.4.4.

A.5　And finally⋯

我們希望您的 Debian 安裝順利愉快，並希望您能瞭解 Debian 好用之處。您或許想閱讀章 8。

Appendix B

Automating the installation using preseeding

This appendix explains how to preseed answers to questions in `debian-installer` to automate your installation.

The configuration fragments used in this appendix are also available as an example preconfiguration file from `../example-preseed.txt`.

B.1 Introduction

Preseeding provides a way to set answers to questions asked during the installation process, without having to manually enter the answers while the installation is running. This makes it possible to fully automate most types of installation and even offers some features not available during normal installations.

Preseeding is not required. If you use an empty preseed file, the installer will behave just the same way as in a normal manual installation. Each question you preseed will (if you got it right!) modify the installation in some way from that baseline.

B.1.1 Preseeding methods

There are three methods that can be used for preseeding: initrd, file and network. Initrd preseeding will work with any installation method and supports preseeding of more things, but it requires the most preparation. File and network preseeding each can be used with different installation methods.

The following table shows which preseeding methods can be used with which installation methods.

Installation method	initrd	file	network
CD/DVD/USB	yes	yes	yes[1]
netboot	yes	no	yes
hd-media	yes	yes	yes[1]

An important difference between the preseeding methods is the point at which the preconfiguration file is loaded and processed. For initrd preseeding this is right at the start of the installation, before the first question is even asked. Preseeding from the kernel command line happens just after. It is thus possible to override configuration set in the initrd by editing the kernel command line (either in the bootloader configuration or manually at boot time for bootloaders that allow it). For file preseeding this is after the installation image has been loaded. For network preseeding it is only after the network has been configured.

---

[1] but only if you have network access, and set `preseed/url` appropriately

> **重要**
>
> Obviously, any questions that have been processed before the preconfiguration file is loaded cannot be preseeded (this will include questions that are only displayed at medium or low priority, like the first hardware detection run). A not so convenient way to avoid these questions from being asked is to preseed them through the boot parameters, as described in 節 B.2.2.
>
> In order to easily avoid the questions that would normally appear before the preseeding occurs, you can start the installer in "auto" mode. This delays questions that would normally be asked too early for preseeding (i.e. language, country and keyboard selection) until after the network comes up, thus allowing them to be preseeded. It also runs the installation at critical priority, which avoids many unimportant questions. See 節 B.2.3 for details.

B.1.2 Limitations

Although most questions used by `debian-installer` can be preseeded using this method, there are some notable exceptions. You must (re)partition an entire disk or use available free space on a disk; it is not possible to use existing partitions.

B.2 Using preseeding

You will first need to create a preconfiguration file and place it in the location from where you want to use it. Creating the preconfiguration file is covered later in this appendix. Putting it in the correct location is fairly straightforward for network preseeding or if you want to read the file off a usb-stick. If you want to include the file in an installation ISO image, you will have to remaster the image. How to get the preconfiguration file included in the initrd is outside the scope of this document; please consult the developers' documentation for `debian-installer`.

An example preconfiguration file that you can use as basis for your own preconfiguration file is available from `../example-preseed.txt`. This file is based on the configuration fragments included in this appendix.

B.2.1 Loading the preconfiguration file

If you are using initrd preseeding, you only have to make sure a file named `preseed.cfg` is included in the root directory of the initrd. The installer will automatically check if this file is present and load it.

For the other preseeding methods you need to tell the installer what file to use when you boot it. This is normally done by passing the kernel a boot parameter, either manually at boot time or by editing the bootloader configuration file (e.g. `grub.cfg`) and adding the parameter to the end of the `gnumach.gz` line.

If you do specify the preconfiguration file in the bootloader configuration, you might change the configuration so you don't need to hit enter to boot the installer. For grub this means setting the timeout to 0 in `grub.cfg`.

To make sure the installer gets the right preconfiguration file, you can optionally specify a checksum for the file. Currently this needs to be a md5sum, and if specified it must match the preconfiguration file or the installer will refuse to use it.

```
Boot parameters to specify:
- if you're netbooting:
  preseed/url=http://host/path/to/preseed.cfg
  preseed/url/checksum=5da499872becccfeda2c4872f9171c3d
- or
  preseed/url=tftp://host/path/to/preseed.cfg
  preseed/url/checksum=5da499872becccfeda2c4872f9171c3d
```

```
- if you're booting a remastered installation image:
  preseed/file=/cdrom/preseed.cfg
  preseed/file/checksum=5da499872becccfeda2c4872f9171c3d

- if you're installing from USB media (put the preconfiguration file in the
  toplevel directory of the USB stick):
  preseed/file=/hd-media/preseed.cfg
  preseed/file/checksum=5da499872becccfeda2c4872f9171c3d
```

Note that `preseed/url` can be shortened to just `url`, `preseed/file` to just `file` and `preseed/file/checksum` to just `preseed-md5` when they are passed as boot parameters.

B.2.2 Using boot parameters to preseed questions

If a preconfiguration file cannot be used to preseed some steps, the install can still be fully automated, since you can pass preseed values on the command line when booting the installer.

Boot parameters can also be used if you do not really want to use preseeding, but just want to provide an answer for a specific question. Some examples where this can be useful are documented elsewhere in this manual.

To set a value to be used inside `debian-installer`, just pass `path/to/variable=value` for any of the preseed variables listed in the examples in this appendix. If a value is to be used to configure packages for the target system, you will need to prepend the owner[2] of the variable as in `owner:path/to/variable=value`. If you don't specify the owner, the value for the variable will not be copied to the debconf database in the target system and thus remain unused during the configuration of the relevant package.

Normally, preseeding a question in this way will mean that the question will not be asked. To set a specific default value for a question, but still have the question asked, use "?=" instead of "=" as operator. See also 節 B.5.2.

Note that some variables that are frequently set at the boot prompt have a shorter alias. If an alias is available, it is used in the examples in this appendix instead of the full variable. The `preseed/url` variable for example has been aliased as `url`. Another example is the `tasks` alias, which translates to `tasksel:tasksel/first`.

A "---" in the boot options has special meaning. Kernel parameters that appear after the last "---" may be copied into the bootloader configuration for the installed system (if supported by the installer for the bootloader). The installer will automatically filter out any options (like preconfiguration options) that it recognizes.

For most installations some of the default options in your bootloader configuration file, like `vga=normal`, may be safely removed which may allow you to add more options for preseeding.

> 注
>
> ✎   It may not always be possible to specify values with spaces for boot parameters, even if you delimit them with quotes.

B.2.3 Auto mode

There are several features of Debian Installer that combine to allow fairly simple command lines at the boot prompt to result in arbitrarily complex customized automatic installs.

This is enabled by using the `Automated install` boot choice, also called `auto` for some architectures or boot methods. In this section, `auto` is thus not a parameter, it means selecting that boot choice, and appending the following boot parameters on the boot prompt.

To illustrate this, here are some examples that can be used at the boot prompt:

```
auto url=autoserver
```

---

[2]The owner of a debconf variable (or template) is normally the name of the package that contains the corresponding debconf template. For variables used in the installer itself the owner is "d-i". Templates and variables can have more than one owner which helps to determine whether they can be removed from the debconf database if the package is purged.

This relies on there being a DHCP server that will get the machine to the point where `autoserver` can be resolved by DNS, perhaps after adding the local domain if that was provided by DHCP. If this was done at a site where the domain is `example.com`, and they have a reasonably sane DHCP setup, it would result in the preseed file being retrieved from `http://autoserver.example.com/d-i/trixie/./prese`

The last part of that url (`d-i/trixie/./preseed.cfg`) is taken from `auto-install/defaultroot`. By default this includes the directory `trixie` to allow future versions to specify their own codename and let people migrate forwards in a controlled manner. The `/./` bit is used to indicate a root, relative to which subsequent paths can be anchored (for use in preseed/include and preseed/run). This allows files to be specified either as full URLs, paths starting with / that are thus anchored, or even paths relative to the location where the last preseed file was found. This can be used to construct more portable scripts where an entire hierarchy of scripts can be moved to a new location without breaking it, for example copying the files onto a USB stick when they started out on a web server. In this example, if the preseed file sets `preseed/run` to `/scripts/late_command.sh` then the file will be fetched from `http://autoserver.example.com/d-i/trixie/./scripts/late_command.sh`.

If there is no local DHCP or DNS infrastructure, or if you do not want to use the default path to `preseed.cfg`, you can still use an explicit url, and if you don't use the `/./` element it will be anchored to the start of the path (i.e. the third / in the URL). Here is an example that requires minimal support from the local network infrastructure:

```
auto url=http://192.168.1.2/path/to/mypreseed.file
```

The way this works is that:

- if the URL is missing a protocol, http is assumed,
- if the hostname section contains no periods, it has the domain derived from DHCP appended to it, and
- if there's no /'s after the hostname, then the default path is added.

In addition to specifying the url, you can also specify settings that do not directly affect the behavior of `debian-installer` itself, but can be passed through to scripts specified using `preseed/run` in the loaded preseed file. At present, the only example of this is `auto-install/classes`, which has an alias `classes`. This can be used thus:

```
auto url=example.com classes=class_A;class_B
```

The classes could for example denote the type of system to be installed, or the localization to be used.

It is of course possible to extend this concept, and if you do, it is reasonable to use the auto-install namespace for this. So one might have something like `auto-install/style` which is then used in your scripts. If you feel the need to do this, please mention it on the debian-boot@lists.debian.org mailing list so that we can avoid namespace conflicts, and perhaps add an alias for the parameter for you.

The `auto` boot choice is not yet defined on all arches. The same effect may be achieved by simply adding the two parameters `auto=true priority=critical` to the kernel command line. The `auto` kernel parameter is an alias for `auto-install/enable` and setting it to `true` delays the locale and keyboard questions until after there has been a chance to preseed them, while `priority` is an alias for `debconf/priority` and setting it to `critical` stops any questions with a lower priority from being asked.

Additional options that may be of interest while attempting to automate an install while using DHCP are: `interface=auto netcfg/dhcp_timeout=60` which makes the machine choose the first viable NIC and be more patient about getting a reply to its DHCP query.

> **提示**
>
> An extensive example of how to use this framework, including example scripts and classes, can be found on the website of its developer. The examples available there also show many other nice effects that can be achieved by creative use of preconfiguration.

B.2.4 Aliases useful with preseeding

The following aliases can be useful when using (auto mode) preseeding. Note that these are simply short aliases for question names, and you always need to specify a value as well: for example, auto=true or `interface=eth0`.

priority	debconf/priority
fb	debian-installer/framebuffer
auto	auto-install/enable
classes	auto-install/classes
file	preseed/file
url	preseed/url
theme	debian-installer/theme
language	debian-installer/language
country	debian-installer/country
locale	debian-installer/locale
keymap	keyboard-configuration/xkb-keymap
modules	anna/choose_modules
firmware	hw-detect/firmware-lookup
interface	netcfg/choose_interface
domain	netcfg/get_domain
hostname	netcfg/get_hostname
protocol	mirror/protocol
suite	mirror/suite
recommends	base-installer/install-recommends
tasks	tasksel:tasksel/first
desktop	tasksel:tasksel/desktop
preseed-md5	preseed/file/checksum

B.2.5 Examples of boot prompt preseeding

Here are some examples of how the boot prompt might look like (you will need to adapt this to your needs).

```
# To set French as language and France as country:
/install.amd/vmlinuz vga=788 initrd=/install.amd/gtk/initrd.gz language=fr  ↵
    country=FR --- quiet
# To set English as language and Germany as country, and use a German keyboard  ↵
    layout:
/install.amd/vmlinuz vga=788 initrd=/install.amd/gtk/initrd.gz language=en  ↵
    country=DE locale=en_US.UTF-8 keymap=de --- quiet
# To install the MATE desktop:
/install.amd/vmlinuz vga=788 initrd=/install.amd/gtk/initrd.gz desktop=mate- ↵
    desktop --- quiet
# To install the web-server task:
/install.amd/vmlinuz initrd=/install.amd/initrd.gz tasksel:tasksel/first=web- ↵
    server ---
```

B.2.6 Using a DHCP server to specify preconfiguration files

It's also possible to use DHCP to specify a preconfiguration file to download from the network. DHCP allows specifying a filename. Normally this is a file to netboot, but if it appears to be an URL then installation media that support network preseeding will download the file from the URL and use it as a preconfiguration file. Here is an example of how to set it up in the dhcpd.conf for version 3 of the ISC DHCP server (the isc-dhcp-server Debian package).

```
if substring (option vendor-class-identifier, 0, 3) = "d-i" {
    filename "http://host/preseed.cfg";
}
```

Note that the above example limits this filename to DHCP clients that identify themselves as "d-i", so it will not affect regular DHCP clients, but only the installer. You can also put the text in a stanza for only one particular host to avoid preseeding all installs on your network.

A good way to use the DHCP preseeding is to only preseed values specific to your network, such as the Debian mirror to use. This way installs on your network will automatically get a good mirror selected, but the rest of the installation can be performed interactively. Using DHCP preseeding to fully automate Debian installs should only be done with care.

B.3   Creating a preconfiguration file

The preconfiguration file is in the format used by the debconf-set-selections command. The general format of a line in a preconfiguration file is:

```
<owner> <question name> <question type> <value>
```

The file should start with #_preseed_V1
There are a few rules to keep in mind when writing a preconfiguration file.

- Put only a single space or tab between type and value: any additional whitespace will be interpreted as belonging to the value.

- A line can be split into multiple lines by appending a backslash ("\") as the line continuation character. A good place to split a line is after the question name; a bad place is between type and value. Split lines will be joined into a single line with all leading/trailing whitespace condensed to a single space.

- For debconf variables (templates) used only in the installer itself, the owner should be set to "d-i" ; to preseed variables used in the installed system, the name of the package that contains the corresponding debconf template should be used. Only variables that have their owner set to something other than "d-i" will be propagated to the debconf database for the installed system.

- Most questions need to be preseeded using the values valid in English and not the translated values. However, there are some questions (for example in partman) where the translated values need to be used.

- Some questions take a code as value instead of the English text that is shown during installation.

- Start with #_preseed_V1

- A comment consists of a line which starts with a hash character ("#") and extends up to the length of that line.

The easiest way to create a preconfiguration file is to use the example file linked in 節 B.4 as basis and work from there.

An alternative method is to do a manual installation and then, after rebooting, use the debconf-get-selections from the debconf-utils package to dump both the debconf database and the installer's cdebconf database to a single file:

```
$ echo "#_preseed_V1" > file
$ debconf-get-selections --installer >> file
$ debconf-get-selections >> file
```

However, a file generated in this manner will have some items that should not be preseeded, and the example file is a better starting place for most users.

注

This method relies on the fact that, at the end of the installation, the installer's cdebconf database is saved to the installed system in `/var/log/installer/cdebconf`. However, because the database may contain sensitive information, by default the files are only readable by root.

The directory `/var/log/installer` and all files in it will be deleted from your system if you purge the package `installation-report`.

To check possible values for questions, you can use nano to examine the files in `/var/lib/cdebconf` while an installation is in progress. View `templates.dat` for the raw templates and `questions.dat` for the current values and for the values assigned to variables.

To check if the format of your preconfiguration file is valid before performing an install, you can use the command debconf-set-selections `-c preseed.cfg`.

B.4   Contents of the preconfiguration file (for trixie)

The configuration fragments used in this appendix are also available as an example preconfiguration file from `../example-preseed.txt`.

Note that this example is based on an installation for the Intel x86 architecture. If you are installing a different architecture, some of the examples (like keyboard selection and bootloader installation) may not be relevant and will need to be replaced by debconf settings appropriate for your architecture.

Details on how the different Debian Installer components actually work can be found in 節 6.3.

B.4.1   Localization

During a normal install the questions about localization are asked first, so these values can only be preseeded via the initrd or kernel boot parameter methods. Auto mode (節 B.2.3) includes the setting of `auto-install/enable=true` (normally via the `auto` preseed alias). This delays the asking of the localisation questions, so that they can be preseeded by any method.

The locale can be used to specify both language and country and can be any combination of a language supported by `debian-installer` and a recognized country. If the combination does not form a valid locale, the installer will automatically select a locale that is valid for the selected language. To specify the locale as a boot parameter, use `locale=en_US.UTF-8`.

Although this method is very easy to use, it does not allow preseeding of all possible combinations of language, country and locale[3]. So alternatively the values can be preseeded individually. Language and country can also be specified as boot parameters.

```
# Preseeding only locale sets language, country and locale.
d-i debian-installer/locale string en_US.UTF-8

# The values can also be preseeded individually for greater flexibility.
#d-i debian-installer/language string en
#d-i debian-installer/country string NL
#d-i debian-installer/locale string en_GB.UTF-8
# Optionally specify additional locales to be generated.
#d-i localechooser/supported-locales multiselect en_US.UTF-8, nl_NL.UTF-8
```

Keyboard configuration consists of selecting a keymap and (for non-latin keymaps) a toggle key to switch between the non-latin keymap and the US keymap. Only basic keymap variants are available during installation. Advanced variants are available only in the installed system, through dpkg-reconfigure keyboard-configuration.

```
# Keyboard selection.
d-i keyboard-configuration/xkb-keymap select us
```

---

[3]Preseeding `locale` to en_NL would for example result in en_US.UTF-8 as default locale for the installed system. If e.g. en_GB.UTF-8 is preferred instead, the values will need to be preseeded individually.

```
# d-i keyboard-configuration/toggle select No toggling
```

To skip keyboard configuration, preseed keymap with skip-config. This will result in the kernel keymap remaining active.

B.4.2　Network configuration

Of course, preseeding the network configuration won't work if you're loading your preconfiguration file from the network. But it's great when you're booting from optical disc or USB stick. If you are loading preconfiguration files from the network, you can pass network config parameters by using kernel boot parameters.

If you need to pick a particular interface when netbooting before loading a preconfiguration file from the network, use a boot parameter such as interface=eth1.

Although preseeding the network configuration is normally not possible when using network pre-seeding (using "preseed/url"), you can use the following hack to work around that, for example if you'd like to set a static address for the network interface. The hack is to force the network configuration to run again after the preconfiguration file has been loaded by creating a "preseed/run" script containing the following commands:

```
kill-all-dhcp; netcfg
```

The following debconf variables are relevant for network configuration.

```
# Disable network configuration entirely. This is useful for cdrom
# installations on non-networked devices where the network questions,
# warning and long timeouts are a nuisance.
#d-i netcfg/enable boolean false

# netcfg will choose an interface that has link if possible. This makes it
# skip displaying a list if there is more than one interface.
d-i netcfg/choose_interface select auto

# To pick a particular interface instead:
#d-i netcfg/choose_interface select eth1

# To set a different link detection timeout (default is 3 seconds).
# Values are interpreted as seconds.
#d-i netcfg/link_wait_timeout string 10

# If you have a slow dhcp server and the installer times out waiting for
# it, this might be useful.
#d-i netcfg/dhcp_timeout string 60
#d-i netcfg/dhcpv6_timeout string 60

# Automatic network configuration is the default.
# If you prefer to configure the network manually, uncomment this line and
# the static network configuration below.
#d-i netcfg/disable_autoconfig boolean true

# If you want the preconfiguration file to work on systems both with and
# without a dhcp server, uncomment these lines and the static network
# configuration below.
#d-i netcfg/dhcp_failed note
#d-i netcfg/dhcp_options select Configure network manually

# Static network configuration.
#
# IPv4 example
#d-i netcfg/get_ipaddress string 192.168.1.42
#d-i netcfg/get_netmask string 255.255.255.0
#d-i netcfg/get_gateway string 192.168.1.1
#d-i netcfg/get_nameservers string 192.168.1.1
#d-i netcfg/confirm_static boolean true
```

```
#
# IPv6 example
#d-i netcfg/get_ipaddress string fc00::2
#d-i netcfg/get_netmask string ffff:ffff:ffff:ffff::
#d-i netcfg/get_gateway string fc00::1
#d-i netcfg/get_nameservers string fc00::1
#d-i netcfg/confirm_static boolean true

# Any hostname and domain names assigned from dhcp take precedence over
# values set here. However, setting the values still prevents the questions
# from being shown, even if values come from dhcp.
d-i netcfg/get_hostname string unassigned-hostname
d-i netcfg/get_domain string unassigned-domain

# If you want to force a hostname, regardless of what either the DHCP
# server returns or what the reverse DNS entry for the IP is, uncomment
# and adjust the following line.
#d-i netcfg/hostname string somehost

# Disable that annoying WEP key dialog.
d-i netcfg/wireless_wep string
# The wacky dhcp hostname that some ISPs use as a password of sorts.
#d-i netcfg/dhcp_hostname string radish

# If you want to completely disable firmware lookup (i.e. not use firmware
# files or packages that might be available on installation images):
#d-i hw-detect/firmware-lookup string never

# If non-free firmware is needed for the network or other hardware, you can
# configure the installer to always try to load it, without prompting. Or
# change to false to disable asking.
#d-i hw-detect/load_firmware boolean true
```

Please note that netcfg will automatically determine the netmask if `netcfg/get_netmask` is not preseeded. In this case, the variable has to be marked as seen for automatic installations. Similarly, netcfg will choose an appropriate address if `netcfg/get_gateway` is not set. As a special case, you can set `netcfg/get_gateway` to "none" to specify that no gateway should be used.

B.4.3   Network console

```
# Use the following settings if you wish to make use of the network-console
# component for remote installation over SSH. This only makes sense if you
# intend to perform the remainder of the installation manually.
#d-i anna/choose_modules string network-console
#d-i network-console/authorized_keys_url string http://10.0.0.1/openssh-key
#d-i network-console/password password r00tme
#d-i network-console/password-again password r00tme
```

More information related to network-console can be found in 節 6.3.10.

B.4.4   Mirror settings

Depending on the installation method you use, a mirror may be used to download additional components of the installer, to install the base system, and to set up the `/etc/apt/sources.list` for the installed system.

The parameter `mirror/suite` determines the suite for the installed system.

The parameter `mirror/udeb/suite` determines the suite for additional components for the installer. It is only useful to set this if components are actually downloaded over the network and should match the suite that was used to build the initrd for the installation method used for the installation. Normally the installer will automatically use the correct value and there should be no need to set this.

```
# Mirror protocol:
# If you select ftp, the mirror/country string does not need to be set.
# Default value for the mirror protocol: http.
#d-i mirror/protocol string ftp
d-i mirror/country string manual
d-i mirror/http/hostname string http.us.debian.org
d-i mirror/http/directory string /debian
d-i mirror/http/proxy string

# Suite to install.
#d-i mirror/suite string testing
# Suite to use for loading installer components (optional).
#d-i mirror/udeb/suite string testing
```

B.4.5   Account setup

The password for the root account and name and password for a first regular user's account can be preseeded. For the passwords you can use either clear text values or crypt(3) hashes.

> **警告**
>
> ⚠ Be aware that preseeding passwords is not completely secure as everyone with access to the preconfiguration file will have the knowledge of these passwords. Storing hashed passwords is considered secure unless a weak hashing algorithm like DES or MD5 is used which allow for bruteforce attacks. Recommended password hashing algorithms are SHA-256 and SHA512.

```
# Skip creation of a root account (normal user account will be able to
# use sudo).
#d-i passwd/root-login boolean false
# Alternatively, to skip creation of a normal user account.
#d-i passwd/make-user boolean false

# Root password, either in clear text
#d-i passwd/root-password password r00tme
#d-i passwd/root-password-again password r00tme
# or encrypted using a crypt(3)  hash.
#d-i passwd/root-password-crypted password [crypt(3) hash]

# To create a normal user account.
#d-i passwd/user-fullname string Debian User
#d-i passwd/username string debian
# Normal user's password, either in clear text
#d-i passwd/user-password password insecure
#d-i passwd/user-password-again password insecure
# or encrypted using a crypt(3) hash.
#d-i passwd/user-password-crypted password [crypt(3) hash]
# Create the first user with the specified UID instead of the default.
#d-i passwd/user-uid string 1010

# The user account will be added to some standard initial groups. To
# override that, use this.
#d-i passwd/user-default-groups string audio cdrom video
```

The `passwd/root-password-crypted` and `passwd/user-password-crypted` variables can also be preseeded with "!" as their value. In that case, the corresponding account is disabled. This may be convenient for the root account, provided of course that an alternative method is set up to allow administrative activities or root login (for instance by using SSH key authentication or sudo).

The following command (available from the whois package) can be used to generate a SHA-512 based crypt(3) hash for a password:

```
mkpasswd -m sha-512
```

B.4.6   Clock and time zone setup

```
# Controls whether or not the hardware clock is set to UTC.
d-i clock-setup/utc boolean true

# You may set this to any valid setting for $TZ; see the contents of
# /usr/share/zoneinfo/ for valid values.
d-i time/zone string US/Eastern

# Controls whether to use NTP to set the clock during the install
d-i clock-setup/ntp boolean true
# NTP server to use. The default is almost always fine here.
#d-i clock-setup/ntp-server string ntp.example.com
```

B.4.7   Partitioning

Using preseeding to partition the harddisk is limited to what is supported by partman-auto. You can choose to partition either existing free space on a disk or a whole disk. The layout of the disk can be determined by using a predefined recipe, a custom recipe from a recipe file or a recipe included in the preconfiguration file.

Preseeding of advanced partition setups using RAID, LVM and encryption is supported, but not with the full flexibility possible when partitioning during a non-preseeded install.

The examples below only provide basic information on the use of recipes. For detailed information see the files partman-auto-recipe.txt and partman-auto-raid-recipe.txt included in the debian-installer package. Both files are also available from the debian-installer source repository. Note that the supported functionality may change between releases.

> **警告**
>
> ⚠ The identification of disks is dependent on the order in which their drivers are loaded. If there are multiple disks in the system, make very sure the correct one will be selected before using preseeding.

B.4.7.1   Partitioning example

```
# If the system has free space you can choose to only partition that space.
# This is only honoured if partman-auto/method (below) is not set.
#d-i partman-auto/init_automatically_partition select biggest_free

# Alternatively, you may specify a disk to partition. If the system has only
# one disk the installer will default to using that, but otherwise the device
# name must be given in traditional, non-devfs format (so e.g. /dev/sda
# and not e.g. /dev/discs/disc0/disc).
# For example, to use the first SCSI/SATA hard disk:
#d-i partman-auto/disk string /dev/sda
# In addition, you'll need to specify the method to use.
# The presently available methods are:
# - regular: use the usual partition types for your architecture
# - lvm:     use LVM to partition the disk
# - crypto:  use LVM within an encrypted partition
d-i partman-auto/method string lvm
```

```
# You can define the amount of space that will be used for the LVM volume
# group. It can either be a size with its unit (eg. 20 GB), a percentage of
# free space or the 'max' keyword.
d-i partman-auto-lvm/guided_size string max

# If one of the disks that are going to be automatically partitioned
# contains an old LVM configuration, the user will normally receive a
# warning. This can be preseeded away...
d-i partman-lvm/device_remove_lvm boolean true
# The same applies to pre-existing software RAID array:
d-i partman-md/device_remove_md boolean true
# And the same goes for the confirmation to write the lvm partitions.
d-i partman-lvm/confirm boolean true
d-i partman-lvm/confirm_nooverwrite boolean true

# You can choose one of the three predefined partitioning recipes:
# - atomic: all files in one partition
# - home:   separate /home partition
# - multi:  separate /home, /var, and /tmp partitions
d-i partman-auto/choose_recipe select atomic

# Or provide a recipe of your own...
# If you have a way to get a recipe file into the d-i environment, you can
# just point at it.
#d-i partman-auto/expert_recipe_file string /hd-media/recipe

# If not, you can put an entire recipe into the preconfiguration file in one
# (logical) line. This example creates a small /boot partition, suitable
# swap, and uses the rest of the space for the root partition:
#d-i partman-auto/expert_recipe string                         \
#      boot-root ::                                            \
#              40 50 100 ext3                                  \
#                      $primary{ } $bootable{ }                \
#                      method{ format } format{ }              \
#                      use_filesystem{ } filesystem{ ext3 }    \
#                      mountpoint{ /boot }                     \
#              .                                               \
#              500 10000 1000000000 ext3                       \
#                      method{ format } format{ }              \
#                      use_filesystem{ } filesystem{ ext3 }    \
#                      mountpoint{ / }                         \
#              .                                               \
#              64 512 300% linux-swap                          \
#                      method{ swap } format{ }                \
#              .

# The full recipe format is documented in the file partman-auto-recipe.txt
# included in the 'debian-installer' package or available from D-I source
# repository. This also documents how to specify settings such as file
# system labels, volume group names and which physical devices to include
# in a volume group.

## Partitioning for EFI
# If your system needs an EFI partition you could add something like
# this to the recipe above, as the first element in the recipe:
#              538 538 1075 free                               \
#                      $iflabel{ gpt }                         \
#                      $reusemethod{ }                         \
#                      method{ efi }                           \
#                      format{ }                               \
#              .                                               \
#
# The fragment above is for the amd64 architecture; the details may be
```

```
# different on other architectures. The 'partman-auto' package in the
# D-I source repository may have an example you can follow.

# This makes partman automatically partition without confirmation, provided
# that you told it what to do using one of the methods above.
d-i partman-partitioning/confirm_write_new_label boolean true
d-i partman/choose_partition select finish
d-i partman/confirm boolean true
d-i partman/confirm_nooverwrite boolean true

# Force UEFI booting ('BIOS compatibility' will be lost). Default: false.
#d-i partman-efi/non_efi_system boolean true
# Ensure the partition table is GPT - this is required for EFI
#d-i partman-partitioning/choose_label select gpt
#d-i partman-partitioning/default_label string gpt

# When disk encryption is enabled, skip wiping the partitions beforehand.
#d-i partman-auto-crypto/erase_disks boolean false
```

B.4.7.2　Partitioning using RAID

You can also use preseeding to set up partitions on software RAID arrays. Supported are RAID levels 0, 1, 5, 6 and 10, creating degraded arrays and specifying spare devices.

　　If you are using RAID 1, you can preseed grub to install to all devices used in the array; see 節 B.4.11.

> **警告**
>
> ⚠ This type of automated partitioning is easy to get wrong.　It is also functionality that receives relatively little testing from the developers of debian-installer. The responsibility to get the various recipes right (so they make sense and don't conflict) lies with the user. Check /var/log/syslog if you run into problems.

```
# The method should be set to "raid".
#d-i partman-auto/method string raid
# Specify the disks to be partitioned. They will all get the same layout,
# so this will only work if the disks are the same size.
#d-i partman-auto/disk string /dev/sda /dev/sdb

# Next you need to specify the physical partitions that will be used.
#d-i partman-auto/expert_recipe string                      \
#      multiraid ::                                          \
#              1000 5000 4000 raid                           \
#                      $primary{ } method{ raid }            \
#              .                                             \
#              64 512 300% raid                              \
#                      method{ raid }                        \
#              .                                             \
#              500 10000 1000000000 raid                     \
#                      method{ raid }                        \
#              .

# Last you need to specify how the previously defined partitions will be
# used in the RAID setup. Remember to use the correct partition numbers
# for logical partitions. RAID levels 0, 1, 5, 6 and 10 are supported;
# devices are separated using "#".
# Parameters are:
# <raidtype> <devcount> <sparecount> <fstype> <mountpoint> \
#         <devices> <sparedevices>
```

```
#d-i partman-auto-raid/recipe string \
#    1 2 0 ext3 /                     \
#           /dev/sda1#/dev/sdb1        \
#    .                                \
#    1 2 0 swap -                     \
#           /dev/sda5#/dev/sdb5        \
#    .                                \
#    0 2 0 ext3 /home                 \
#           /dev/sda6#/dev/sdb6        \
#    .

# For additional information see the file partman-auto-raid-recipe.txt
# included in the 'debian-installer' package or available from D-I source
# repository.

# This makes partman automatically partition without confirmation.
d-i partman-md/confirm boolean true
d-i partman-partitioning/confirm_write_new_label boolean true
d-i partman/choose_partition select finish
d-i partman/confirm boolean true
d-i partman/confirm_nooverwrite boolean true
```

B.4.7.3 Controlling how partitions are mounted

Normally, filesystems are mounted using a universally unique identifier (UUID) as a key; this allows them to be mounted properly even if their device name changes. UUIDs are long and difficult to read, so, if you prefer, the installer can mount filesystems based on the traditional device names, or based on a label you assign. If you ask the installer to mount by label, any filesystems without a label will be mounted using a UUID instead.

Devices with stable names, such as LVM logical volumes, will continue to use their traditional names rather than UUIDs.

> **警告**
>
> ⚠ Traditional device names may change based on the order in which the kernel discovers devices at boot, which may cause the wrong filesystem to be mounted. Similarly, labels are likely to clash if you plug in a new disk or a USB drive, and if that happens your system's behaviour when started will be random.

```
# The default is to mount by UUID, but you can also choose "traditional" to
# use traditional device names, or "label" to try filesystem labels before
# falling back to UUIDs.
#d-i partman/mount_style select uuid
```

B.4.8 Base system installation

There is actually not very much that can be preseeded for this stage of the installation. The only questions asked concern the installation of the kernel.

```
# Configure APT to not install recommended packages by default. Use of this
# option can result in an incomplete system and should only be used by very
# experienced users.
#d-i base-installer/install-recommends boolean false

# The kernel image (meta) package to be installed; "none" can be used if no
# kernel is to be installed.
#d-i base-installer/kernel/image string gnumach-686
```

B.4.9   Apt setup

Setup of the `/etc/apt/sources.list` and basic configuration options is fully automated based on your installation method and answers to earlier questions. You can optionally add other (local) repositories.

```
# Choose, if you want to scan additional installation media
# (default: false).
d-i apt-setup/cdrom/set-first boolean false
# You can choose to install non-free firmware.
#d-i apt-setup/non-free-firmware boolean true
# You can choose to install non-free and contrib software.
#d-i apt-setup/non-free boolean true
#d-i apt-setup/contrib boolean true
# Uncomment the following line, if you don't want to have the sources.list
# entry for a DVD/BD installation image active in the installed system
# (entries for netinst or CD images will be disabled anyway, regardless of
# this setting).
#d-i apt-setup/disable-cdrom-entries boolean true
# Uncomment this if you don't want to use a network mirror.
#d-i apt-setup/use_mirror boolean false
# Select which update services to use; define the mirrors to be used.
# Values shown below are the normal defaults.
#d-i apt-setup/services-select multiselect security, updates
#d-i apt-setup/security_host string security.debian.org


# Additional repositories, local[0-9] available
#d-i apt-setup/local0/repository string \
#       http://local.server/debian stable main
#d-i apt-setup/local0/comment string local server
# Enable deb-src lines
#d-i apt-setup/local0/source boolean true
# URL to the public key of the local repository; you must provide a key or
# apt will complain about the unauthenticated repository and so the
# sources.list line will be left commented out.
#d-i apt-setup/local0/key string http://local.server/key
# or one can provide it in-line by base64 encoding the contents of the
# key file (with 'base64 -w0') and specifying it thus:
#d-i apt-setup/local0/key string base64:// ↩
    LS0tLS1CRUdJTiBQR1AgUFVCTElDIEtFWSBCTE9DSy0tLS0tCi4uLgo=
# The content of the key file is checked to see if it appears to be ASCII- ↩
    armoured.
# If so it will be saved with an ".asc" extension, otherwise it gets a '.gpg' ↩
    extension.
# "keybox database" format is currently not supported. (see generators/60local in ↩
     apt-setup's source)

# By default the installer requires that repositories be authenticated
# using a known gpg key. This setting can be used to disable that
# authentication. Warning: Insecure, not recommended.
#d-i debian-installer/allow_unauthenticated boolean true

# Uncomment this to add multiarch configuration for i386
#d-i apt-setup/multiarch string i386
```

B.4.10   Package selection

You can choose to install any combination of tasks that are available. Available tasks as of this writing include:

- `standard` (standard tools)

- `desktop` (graphical desktop)

- gnome-desktop (Gnome desktop)

- xfce-desktop (XFCE desktop)

- kde-desktop (KDE Plasma desktop)

- cinnamon-desktop (Cinnamon desktop)

- mate-desktop (MATE desktop)

- lxde-desktop (LXDE desktop)

- web-server (web server)

- ssh-server (SSH server)

You can also choose to install no tasks, and force the installation of a set of packages in some other way. We recommend always including the standard task.

Or if you don't want the tasksel dialog to be shown at all, preseed pkgsel/run_tasksel (no packages are installed via tasksel in that case).

If you want to install some individual packages in addition to packages installed by tasks, you can use the parameter pkgsel/include. The value of this parameter can be a list of packages separated by either commas or spaces, which allows it to be used easily on the kernel command line as well.

```
#tasksel tasksel/first multiselect standard, web-server, kde-desktop

# Or choose to not get the tasksel dialog displayed at all (and don't install
# any packages):
#d-i pkgsel/run_tasksel boolean false

# Individual additional packages to install
#d-i pkgsel/include string openssh-server build-essential
# Whether to upgrade packages after debootstrap.
# Allowed values: none, safe-upgrade, full-upgrade
#d-i pkgsel/upgrade select none

# You can choose, if your system will report back on what software you have
# installed, and what software you use. The default is not to report back,
# but sending reports helps the project determine what software is most
# popular and should be included on the first DVD.
#popularity-contest popularity-contest/participate boolean false
```

B.4.11 Boot loader installation

```
# To install no bootloader, uncomment this
#d-i grub-installer/skip boolean true

# This is fairly safe to set, it makes grub install automatically to the UEFI
# partition/boot record if no other operating system is detected on the machine.
d-i grub-installer/only_debian boolean true

# This one makes grub-installer install to the UEFI partition/boot record, if
# it also finds some other OS, which is less safe as it might not be able to
# boot that other OS.
d-i grub-installer/with_other_os boolean true

# Due notably to potential USB sticks, the location of the primary drive can
# not be determined safely in general, so this needs to be specified:
#d-i grub-installer/bootdev  string /dev/sda
# To install to the primary device (assuming it is not a USB stick):
#d-i grub-installer/bootdev  string default

# Alternatively, if you want to install to a location other than the UEFI
# parition/boot record, uncomment and edit these lines:
```

```
#d-i grub-installer/only_debian boolean false
#d-i grub-installer/with_other_os boolean false
#d-i grub-installer/bootdev  string (hd0,1)
# To install grub to multiple disks:
#d-i grub-installer/bootdev  string (hd0,1) (hd1,1) (hd2,1)

# Optional password for grub, either in clear text
#d-i grub-installer/password password r00tme
#d-i grub-installer/password-again password r00tme
# or encrypted using an MD5 hash, see grub-md5-crypt(8).
#d-i grub-installer/password-crypted password [MD5 hash]

# Use the following option to add additional boot parameters for the
# installed system (if supported by the bootloader installer).
# Note: options passed to the installer will be added automatically.
#d-i debian-installer/add-kernel-opts string nousb
```

An MD5 hash for a password for `grub` can be generated using grub-md5-crypt, or using the command from the example in 節 B.4.5.

B.4.12 Finishing up the installation

```
# During installations from serial console, the regular virtual consoles
# (VT1-VT6) are normally disabled in /etc/inittab. Uncomment the next
# line to prevent this.
#d-i finish-install/keep-consoles boolean true

# Avoid that last message about the install being complete.
d-i finish-install/reboot_in_progress note

# This will prevent the installer from ejecting the disc during the reboot,
# which is useful in some situations.
#d-i cdrom-detect/eject boolean false

# This is how to make the installer shutdown when finished, but not
# reboot into the installed system.
#d-i debian-installer/exit/halt boolean true
# This will power off the machine instead of just halting it.
#d-i debian-installer/exit/poweroff boolean true
```

B.4.13 Preseeding other packages

```
# Depending on what software you choose to install, or if things go wrong
# during the installation process, it's possible that other questions may
# be asked. You can preseed those too, of course. To get a list of every
# possible question that could be asked during an install, do an
# installation, and then run these commands:
#   debconf-get-selections --installer > file
#   debconf-get-selections >> file
```

B.5 Advanced options

B.5.1 Running custom commands during the installation

A very powerful and flexible option offered by the preconfiguration tools is the ability to run commands or scripts at certain points in the installation.

When the filesystem of the target system is mounted, it is available in `/target`. If an installation CD/DVD is used, when it is mounted it is available in `/cdrom`.

```
# d-i preseeding is inherently not secure. Nothing in the installer checks
# for attempts at buffer overflows or other exploits of the values of a
# preconfiguration file like this one. Only use preconfiguration files from
# trusted locations! To drive that home, and because it's generally useful,
# here's a way to run any shell command you'd like inside the installer,
# automatically.

# This first command is run as early as possible, just after
# preseeding is read.
#d-i preseed/early_command string anna-install some-udeb
# This command is run immediately before the partitioner starts. It may be
# useful to apply dynamic partitioner preseeding that depends on the state
# of the disks (which may not be visible when preseed/early_command runs).
#d-i partman/early_command \
#       string debconf-set partman-auto/disk "$(list-devices disk | head -n1)"
# This command is run just before the install finishes, but when there is
# still a usable /target directory. You can chroot to /target and use it
# directly, or use the apt-install and in-target commands to easily install
# packages and run commands in the target system.
#d-i preseed/late_command string apt-install zsh; in-target chsh -s /bin/zsh
```

B.5.2 Using preseeding to change default values

It is possible to use preseeding to change the default answer for a question, but still have the question asked. To do this the seen flag must be reset to "false" after setting the value for a question.

```
d-i foo/bar string value
d-i foo/bar seen false
```

The same effect can be achieved for all questions by setting the parameter `preseed/interactive=true` at the boot prompt. This can also be useful for testing or debugging your preconfiguration file.

Note that the "d-i" owner should only be used for variables used in the installer itself. For variables belonging to packages installed on the target system, you should use the name of that package instead. See the footnote to 節 B.2.2.

If you are preseeding using boot parameters, you can make the installer ask the corresponding question by using the "?=" operator, i.e. `foo/bar?=value` (or `owner:foo/bar?=value`). This will of course only have effect for parameters that correspond to questions that are actually displayed during an installation and not for "internal" parameters.

For more debugging information, use the boot parameter `DEBCONF_DEBUG=5`. This will cause `debconf` to print much more detail about the current settings of each variable and about its progress through each package's installation scripts.

B.5.3 Chainloading preconfiguration files

It is possible to include other preconfiguration files from a preconfiguration file. Any settings in those files will override pre-existing settings from files loaded earlier. This makes it possible to put, for example, general networking settings for your location in one file and more specific settings for certain configurations in other files.

```
# More than one file can be listed, separated by spaces; all will be
# loaded. The included files can have preseed/include directives of their
# own as well. Note that if the filenames are relative, they are taken from
# the same directory as the preconfiguration file that includes them.
#d-i preseed/include string x.cfg

# The installer can optionally verify checksums of preconfiguration files
# before using them. Currently only md5sums are supported, list the md5sums
# in the same order as the list of files to include.
#d-i preseed/include/checksum string 5da499872becccfeda2c4872f9171c3d

# More flexibly, this runs a shell command and if it outputs the names of
```

```
# preconfiguration files, includes those files.
#d-i preseed/include_command \
#       string if [ "'hostname'" = bob ]; then echo bob.cfg; fi

# Most flexibly of all, this downloads a program and runs it. The program
# can use commands such as debconf-set to manipulate the debconf database.
# More than one script can be listed, separated by spaces.
# Note that if the filenames are relative, they are taken from the same
# directory as the preconfiguration file that runs them.
#d-i preseed/run string foo.sh
```

It is also possible to chainload from the initrd or file preseeding phase, into network preseeding by setting preseed/url in the earlier files. This will cause network preseeding to be performed when the network comes up. You need to be careful when doing this, since there will be two distinct runs at preseeding, meaning for example that you get another chance to run the preseed/early command, the second one happening after the network comes up.

Appendix C

為 Debian 分割磁區

C.1　決定 Debian 磁區及大小

最小化情況下，GNU/Hurd 需要一個分割區。您可以有一個包含整個作業系統，應用程式以及您個人檔案的分割區。大多數人認為另建一個的置換分割區是有必要的，雖然嚴格來說它並不正確。"Swap"是一個作業系統用的空白空間，允許系統使用磁碟來提供"虛擬記憶體"。通過置換空間至一個分離的分割區，Hurd 可以有效地使用它。強迫 Hurd 使用一個一般檔案作為置換空間也是可行的，但是並不建議這種做法。

　　大多數人選擇給 GNU/Linu 比最小化更多的分區。有兩個原因可能使您願意把檔案系統打散放置到一些較小的分區上。第一個問題是安全性，如果檔案系統出現了問題，一般來說只有一個磁區會受到影響。因此，您只需要更換 (來自於您小心維護的備份) 一個磁區。在最小化階段，您應該考慮建立所謂的"根分割區"。它含有最主要的系統組件。如果其它分割區出現了問題，您仍可以進入至 GNU/Hurd 來修復系統。這樣您可以不必從頭重新安裝系統。

　　第二個理由對商業設置來說更重要，但它實際上取決於您機器的使用。比如，一個郵件伺服器接受到很多垃圾郵件會很快填滿一個分割區，如果您建立 /var/mail 在一個分離的分割區上面，大多數系統在您得到太多垃圾郵件的情況下會繼續工作。

　　使用更多分割區的唯一缺點是很難預先知道您將來的需求。如果您建立了一個太小的分割區，則您可能需要重新安裝系統或者不停地移動資料以增加分割區空間。除此之外，如果您建立的分割區過大，您將浪費一些可以用在別的地方的空間。硬碟容量目前很便宜，但是為什麼要浪費呢？

C.2　目錄樹

Debian GNU/Hurd 依照 檔案系統層次標準 (Filesystem Hierarchy Standard) 為目錄以及檔案命名。這個標準允許使用者以及軟體程式預測檔案及目錄的位置。根層次目錄只是簡單表現為 /。在根層次，所有的 Debian 系統包括這些目錄：

目錄	內容
bin	基礎命令執行檔案
boot	boot loader 的靜態鏈結檔案
dev	裝置檔案
etc	主機特定的系統設定
home	使用者家目錄
lib	基本共享程式庫以及核心單元
media	包含移動媒介的掛載點
mnt	暫時掛載檔案系統的掛載點
proc	Virtual directory for system information
root	根使用者的家目錄
run	Run-time variable data
sbin	基本的系統執行檔案
sys	Virtual directory for system information
tmp	暫存檔
usr	第二層次
var	變動資料

目錄	內容
`srv`	Data for services provided by the system
`opt`	附加的應用程式軟體套件

下面列出關於目錄和分割區的重要考量。要注意硬碟的使用隨系統設定和特定用途有很大變化。這裡的建議是一般導引，提供分割區的基本分割方式。

- The root partition `/` must always physically contain `/etc`, `/bin`, `/sbin`, `/lib`, `/dev` and `/usr`, otherwise you won't be able to boot. This means that you should provide at least 600–750MB of disk space for the root partition including `/usr`, or 5–6GB for a workstation or a server installation.

- `/var`: variable data like news articles, e-mails, web sites, databases, the packaging system cache, etc. will be placed under this directory. The size of this directory depends greatly on the usage of your system, but for most people will be dictated by the package management tool's overhead. If you are going to do a full installation of just about everything Debian has to offer, all in one session, setting aside 2 or 3 GB of space for `/var` should be sufficient. If you are going to install in pieces (that is to say, install services and utilities, followed by text stuff, then X, ...), you can get away with 300–500 MB. If hard drive space is at a premium and you don't plan on doing major system updates, you can get by with as little as 30 or 40 MB.

- `/tmp`: temporary data created by programs will most likely go in this directory. 40–100MB should usually be enough. Some applications —including archive manipulators, CD/DVD authoring tools, and multimedia software —may use `/tmp` to temporarily store image files. If you plan to use such applications, you should adjust the space available in `/tmp` accordingly.

- `/home`: every user will put his personal data into a subdirectory of this directory. Its size depends on how many users will be using the system and what files are to be stored in their directories. Depending on your planned usage you should reserve about 100MB for each user, but adapt this value to your needs. Reserve a lot more space if you plan to save a lot of multimedia files (pictures, MP3, movies) in your home directory.

C.3　建議的分割方案

For new users, personal Debian boxes, home systems, and other single-user setups, a single `/` partition (plus swap) is probably the easiest, simplest way to go. The recommended partition type is ext4.

For multi-user systems or systems with lots of disk space, it's best to put `/var`, `/tmp`, and `/home` each on their own partitions separate from the `/` partition.

You might need a separate `/usr/local` partition if you plan to install many programs that are not part of the Debian distribution. If your machine will be a mail server, you might need to make `/var/mail` a separate partition. If you are setting up a server with lots of user accounts, it's generally good to have a separate, large `/home` partition. In general, the partitioning situation varies from computer to computer depending on its uses.

對於非常複雜的系統來說，您應該閱讀 Multi Disk HOWTO。其中包含了很多對 ISP 以及設定伺服器的用戶來說非常用的深入資訊。

With respect to the issue of swap partition size, there are many views. One rule of thumb which works well is to use as much swap as you have system memory. It also shouldn't be smaller than 512MB, in most cases. Of course, there are exceptions to these rules.

As an example, an older home machine might have 512MB of RAM and a 20GB SATA drive on `/dev/sda`. There might be a 8GB partition for another operating system on `/dev/sda1`, a 512MB swap partition on `/dev/sda3` and about 11.4GB on `/dev/sda2` as the Linux partition.

對於不同工作所需要多大的空間的概念，您也許對於系統安裝完畢後加入的安裝感興趣，請參照節 D.1。

C.4　Debian 分割程式

Debian 開發人員配置了幾種在不同硬碟及電腦架構上的分割區程式。下面是一個適合您的架構的程式列表。

partman Recommended partitioning tool in Debian. This Swiss army knife can also resize partitions, create filesystems（"format"in Windows speak) and assign them to the mountpoints.

fdisk 最早的 Linux 磁碟分割區工具，對高手來說很好用。

Be careful if you have existing FreeBSD partitions on your machine. The installation kernels include support for these partitions, but the way that fdisk represents them (or not) can make the device names differ. See the Linux+FreeBSD HOWTO.

cfdisk 一個簡單易用，給其它人使用的是全螢幕磁碟分割區程式。

請注意 cfdisk 完全不瞭解 FreeBSD 的分割區，而且裝置名稱也可能有所不同。

One of these programs will be run by default when you select Partition disks (or similar). It may be possible to use a different partitioning tool from the command line on VT2, but this is not recommended.

Remember to mark your boot partition as "Bootable".

Appendix D

其他

D.1　各軟體集所需的磁碟空間

A standard installation for the amd64 architecture, including all standard packages and using the default kernel, takes up 1242MB of disk space. A minimal base installation, without the "Standard system utilities" task selected, will take 1012MB.

重要

⚠ In both cases this is the actual disk space used after the installation is finished and any temporary files deleted. It also does not take into account overhead used by the file system, for example for journal files. This means that significantly more disk space is needed both during the installation and for normal system use.

下面的表格一一列出了 tasksel 中每個軟體集所需的磁碟空間大小。該列表是使用 aptitude 產生的。請注意，有些軟體集之間會有相重疊的部分，所以兩個軟體集一同安裝後所佔的空間，可能會小於這兩個軟體集分別安裝所佔的空間。

By default the installer will install the GNOME desktop environment, but alternative desktop environments can be selected either by using one of the special installation images, or by specifying the desired desktop environment during installation (see 節 6.3.6.2).

Note that you will need to add the sizes listed in the table to the size of the standard installation when determining the size of partitions. Most of the size listed as "Installed size" will end up in /usr and in /lib; the size listed as "Download size" is (temporarily) required in /var.

軟體集	安裝大小 (MB)	下載大小 (MB)	安裝所需空間 (MB)
Desktop environment			
・GNOME (default)	3216	859	4075
・KDE Plasma	4584	1316	5900
・Xfce	2509	683	3192
・LXDE	2539	693	3232
・MATE	2851	762	3613
・Cinnamon	4676	1324	6000
Web 伺服器	85	19	104
SSH 伺服器	2	1	3

If you install in a language other than English, tasksel may automatically install a localization task, if one is available for your language. Space requirements differ per language; you should allow up to 350MB in total for download and installation.

D.2　透過 Unix/Linux 系統來安裝 Debian GNU/Hurd

本節說明了如何透過現有的 Unix 或 Linux 系統來安裝 Debian GNU/Hurd，而非使用本手冊後面要談到的基於 ncurses，由選單驅動的安裝軟體。這篇"交叉安裝 (cross-install)"HOWTO 是應使用者的要求而撰寫的。他們原來是 Redhat、Mandriva 和 SUSE 的使用者，現轉而使用 Debian GNU/Hurd。在本節中，我們假設您對於輸入 *nix 指令以及在檔案系統中穿梭移動並不生疏。同時，在本節中，$ 符號表示這個指令是在使用者當前使用的系統中輸入的，而 # 則表示這個指令是在 Debian chroot 環境中輸入的。

　　您一旦根據自己的需求設定好了新的 Debian 系統，就可以將您的原來系統中的使用者資料 (如果有的話) 全部遷移到 Debian 裡去。然後就能繼續爽了。一言以蔽之，這是一次"不關機"的 Debian GNU/Hurd 安裝。同時，這也是處理那些因為硬體原因不能透過任何開機或者安裝媒介完成安裝的權宜之計。

> **注**
>
> As this is a mostly manual procedure, you should bear in mind that you will need to do a lot of basic configuration of the system yourself, which will also require more knowledge of Debian and of Hurd in general than performing a regular installation. You cannot expect this procedure to result in a system that is identical to a system from a regular installation. You should also keep in mind that this procedure only gives the basic steps to set up a system. Additional installation and/or configuration steps may be needed.

D.2.1　準備開始

With your current *nix partitioning tools, repartition the hard drive as needed, creating at least one filesystem plus swap. You need around 1012MB of space available for a console only install, or about 2539MB if you plan to install X (more if you intend to install desktop environments like GNOME or KDE Plasma).

　　在您的分割區上建立檔案系統。舉例來說，如果要在 /dev/sda6 分割區 (以後的例子中，將把它作為 root 分割區) 建立一個 ext3 格式的檔案系統：

```
# mke2fs -j /dev/sda6
```

如果想建立的是 ext2 格式的檔案系統，就要去掉 -j。

　　初始化並啟用置換分割區 (請把分割區編號替換成您希望用作置換分割區的分割區編號):

```
# mkswap /dev/sda5
# sync
# swapon /dev/sda5
```

把一個分割區掛載 (mount) 到 /mnt/debinst(這是安裝的位置，將來作為您新系統的根 (/) 檔案系統)。掛載點的名稱是任意的，後面的步驟將會用到它。

```
# mkdir /mnt/debinst
# mount /dev/sda6 /mnt/debinst
```

> **注**
>
> If you want to have parts of the filesystem (e.g. /usr) mounted on separate partitions, you will need to create and mount these directories manually before proceeding with the next stage.

D.2.2　安裝 debootstrap

The utility used by the Debian installer, and recognized as the official way to install a Debian base system, is debootstrap. It uses wget and ar, but otherwise depends only on /bin/sh and basic Unix/Linux

tools[1]. Install wget and ar if they aren't already on your current system, then download and install debootstrap.

Or, you can use the following procedure to install it manually. Make a work folder for extracting the .deb into:

```
# mkdir work
# cd work
```

The debootstrap binary is located in the Debian archive (be sure to select the proper file for your architecture). Download the debootstrap .deb from the pool, copy the package to the work folder, and extract the files from it. You will need to have root privileges to install the files.

```
# ar -x debootstrap_0.X.X_all.deb
# cd /
# zcat /full-path-to-work/work/data.tar.gz | tar xv
```

D.2.3　執行 debootstrap

debootstrap can download the needed files directly from the archive when you run it. You can substitute any Debian archive mirror for `http.us.debian.org/debian` in the command example below, preferably a mirror close to you network-wise. Mirrors are listed at http://www.debian.org/mirror/list.

If you have a trixie Debian GNU/Hurd installation image mounted at `/cdrom`, you could substitute a file URL instead of the http URL: `file:/cdrom/debian/`

Substitute one of the following for `ARCH` in the debootstrap command: `amd64`, `arm64`, `armel`, `armhf`, `i386`, `mips64el`, `mipsel`, `ppc64el`, `s390x`.

```
# /usr/sbin/debootstrap --arch ARCH trixie \
    /mnt/debinst http://ftp.us.debian.org/debian
```

If the target architecture is different than the host, you should add the `--foreign` option.

D.2.4　基本系統的設定

Now you've got a real Debian system, though rather lean, on disk. chroot into it:

```
# LANG=C.UTF-8 chroot /mnt/debinst /bin/bash
```

If the target architecture is different from the host, you will need to first copy qemu-user-static to the new host:

```
# cp /usr/bin/qemu-ARCH-static /mnt/debinst/usr/bin
# LANG=C.UTF-8 chroot /mnt/debinst qemu-ARCH-static /bin/bash
```

After chrooting you may need to set the terminal definition to be compatible with the Debian base system, for example:

```
# export TERM=xterm-color
```

Depending on the value of TERM, you may have to install the `ncurses-term` package to get support for it.

If the target architecture is different from the host, you need to finish the multi-stage boot strap:

```
/debootstrap/debootstrap --second-stage
```

---

[1]These include the GNU core utilities and commands like sed, grep, tar and gzip.

D.2.4.1   Create device files

At this point /dev/ only contains very basic device files. For the next steps of the installation additional device files may be needed. There are different ways to go about this and which method you should use depends on the host system you are using for the installation, on whether you intend to use a modular kernel or not, and on whether you intend to use dynamic (e.g. using udev) or static device files for the new system.

A few of the available options are:

- install the makedev package, and create a default set of static device files using (after chrooting)

```
# apt install makedev
# mount none /proc -t proc
# cd /dev
# MAKEDEV generic
```

- manually create only specific device files using MAKEDEV

- bind mount /dev from your host system on top of /dev in the target system; note that the postinst scripts of some packages may try to create device files, so this option should only be used with care

D.2.4.2   分割區的掛載

You need to create /etc/fstab.

```
# editor /etc/fstab
```

Here is a sample you can modify to suit:

```
# /etc/fstab: static file system information.
#
# file system     mount point     type     options                   dump pass
/dev/XXX          /               ext3     defaults                  0    1
/dev/XXX          /boot           ext3     ro,nosuid,nodev           0    2

/dev/XXX          none            swap     sw                        0    0
proc              /proc           proc     defaults                  0    0

/dev/cdrom        /media/cdrom    iso9660  noauto,ro,user,exec       0    0

/dev/XXX          /tmp            ext3     rw,nosuid,nodev           0    2
/dev/XXX          /var            ext3     rw,nosuid,nodev           0    2
/dev/XXX          /usr            ext3     rw,nodev                  0    2
/dev/XXX          /home           ext3     rw,nosuid,nodev           0    2
```

Use mount -a to mount all the file systems you have specified in your /etc/fstab, or, to mount file systems individually, use:

```
# mount /path    # e.g.: mount /usr
```

Current Debian systems have mountpoints for removable media under /media, but keep compatibility symlinks in /. Create these as as needed, for example:

```
# cd /media
# mkdir cdrom0
# ln -s cdrom0 cdrom
# cd /
# ln -s media/cdrom
```

You can mount the proc file system multiple times and to arbitrary locations, though /proc is customary. If you didn't use mount -a, be sure to mount proc before continuing:

```
# mount -t proc proc /proc
```

The command `ls /proc` should now show a non-empty directory. Should this fail, you may be able to mount proc from outside the chroot:

```
# mount -t proc proc /mnt/debinst/proc
```

D.2.4.3　Setting Timezone

Setting the third line of the file `/etc/adjtime` to "UTC" or "LOCAL" determines whether the system will interpret the hardware clock as being set to UTC respective local time. The following command allows you to set that.

```
# editor /etc/adjtime
```

Here is a sample:

```
0.0 0 0.0
0
UTC
```

The following command allows you to choose your timezone.

```
# dpkg-reconfigure tzdata
```

D.2.4.4　網路的設定

To configure networking, edit `/etc/network/interfaces`, `/etc/resolv.conf`, `/etc/hostname` and `/etc/hosts`.

```
# editor /etc/network/interfaces
```

Here are some simple examples from `/usr/share/doc/ifupdown/examples`:

```
######################################################################
# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)
# See the interfaces(5) manpage for information on what options are
# available.
######################################################################

# The loopback interface isn't really required any longer, but can be used
# if needed.
#
# auto lo
# iface lo inet loopback

# To use dhcp:
#
# auto eth0
# iface eth0 inet dhcp

# An example static IP setup: (network, broadcast and gateway are optional)
#
# auto eth0
# iface eth0 inet static
#     address 192.168.0.42
#     network 192.168.0.0
#     netmask 255.255.255.0
#     broadcast 192.168.0.255
#     gateway 192.168.0.1
```

Enter your nameserver(s) and search directives in `/etc/resolv.conf`:

```
# editor /etc/resolv.conf
```

A simple example `/etc/resolv.conf`:

```
search example.com
nameserver 10.1.1.36
nameserver 192.168.9.100
```

Enter your system's host name (2 to 63 characters):

```
# echo DebianHostName > /etc/hostname
```

And a basic /etc/hosts with IPv6 support:

```
127.0.0.1 localhost
127.0.1.1 DebianHostName

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
ff02::3 ip6-allhosts
```

If you have multiple network cards, you should arrange the names of driver modules in the /etc/ modules file into the desired order. Then during boot, each card will be associated with the interface name (eth0, eth1, etc.) that you expect.

D.2.4.5 Configure Apt

Debootstrap will have created a very basic /etc/apt/sources.list that will allow installing additional packages. However, you may want to add some additional sources, for example for source packages and security updates:

```
deb-src http://ftp.us.debian.org/debian trixie main

deb http://security.debian.org/ trixie-security main
deb-src http://security.debian.org/ trixie-security main
```

Make sure to run apt update after you have made changes to the sources list.

D.2.4.6 Configure Locales and Keyboard

To configure your locale settings to use a language other than English, install the locales support package and configure it. Currently the use of UTF-8 locales is recommended.

```
# apt install locales
# dpkg-reconfigure locales
```

To configure your keyboard (if needed):

```
# apt install console-setup
# dpkg-reconfigure keyboard-configuration
```

Note that the keyboard cannot be set while in the chroot, but will be configured for the next reboot.

D.2.5 核心的安裝

If you intend to boot this system, you probably want a Hurd kernel and a boot loader. Identify available pre-packaged kernels with:

```
# apt search gnumach
```

Then install the kernel package of your choice using its package name.

```
# apt install gnumach-arch-etc
```

D.2.6   Boot Loader 的設定

To make your Debian GNU/Hurd system bootable, set up your boot loader to load the installed kernel with your new root partition. Note that debootstrap does not install a boot loader, but you can use apt inside your Debian chroot to do so.

Check `info grub` for instructions on setting up the bootloader. If you are keeping the system you used to install Debian, just add an entry for the Debian install to your existing grub2 `grub.cfg`.

Installing and setting up `grub2` is as easy as:

```
# apt install grub-pc
# grub-install /dev/sda
# update-grub
```

The second command will install grub2 (in this case in the MBR of `sda`). The last command will create a sane and working `/boot/grub/grub.cfg`.

Note that this assumes that a `/dev/sda` device file has been created. There are alternative methods to install grub2, but those are outside the scope of this appendix.

D.2.7   Remote access: Installing SSH and setting up access

In case you can login to the system via console, you can skip this section. If the system should be accessible via the network later on, you need to install SSH and set up access.

```
# apt install ssh
```

Root login with password is disabled by default, so setting up access can be done by setting a password and re-enable root login with password:

```
# passwd
# editor /etc/ssh/sshd_config
```

This is the option to be enabled:

```
PermitRootLogin yes
```

Access can also be set up by adding an ssh key to the root account:

```
# mkdir /root/.ssh
# cat << EOF > /root/.ssh/authorized_keys
ssh-rsa ....
EOF
```

Lastly, access can be set up by adding a non-root user and setting a password:

```
# adduser joe
# passwd joe
```

D.2.8   Finishing touches

As mentioned earlier, the installed system will be very basic. If you would like to make the system a bit more mature, there is an easy method to install all packages with "standard" priority:

```
# tasksel install standard
```

Of course, you can also just use apt to install packages individually.

After the installation there will be a lot of downloaded packages in `/var/cache/apt/archives/`. You can free up some diskspace by running:

```
# apt clean
```

D.3　Installing Debian GNU/Hurd using PPP over Ethernet (PPPoE)

In some countries PPP over Ethernet (PPPoE) is a common protocol for broadband (ADSL or cable) connections to an Internet Service Provider. Setting up a network connection using PPPoE is not supported by default in the installer, but can be made to work very simply. This section explains how.

The PPPoE connection set up during the installation will also be available after the reboot into the installed system (see 章 7).

To have the option of setting up and using PPPoE during the installation, you will need to install using one of the CD-ROM/DVD images that are available. It is not supported for other installation methods (e.g. netboot).

Installing over PPPoE is mostly the same as any other installation. The following steps explain the differences.

- Boot the installer with the boot parameter `modules=ppp-udeb`. This will ensure the component responsible for the setup of PPPoE (`ppp-udeb`) will be loaded and run automatically.

- Follow the regular initial steps of the installation (language, country and keyboard selection; the loading of additional installer components[2]).

- The next step is the detection of network hardware, in order to identify any Ethernet cards present in the system.

- After this the actual setup of PPPoE is started. The installer will probe all the detected Ethernet interfaces in an attempt to find a PPPoE concentrator (a type of server which handles PPPoE connections).

  It is possible that the concentrator will not to be found at the first attempt. This can happen occasionally on slow or loaded networks or with faulty servers. In most cases a second attempt to detect the concentrator will be successful; to retry, select Configure and start a PPPoE connection from the main menu of the installer.

- After a concentrator is found, the user will be prompted to type the login information (the PPPoE username and password).

- At this point the installer will use the provided information to establish the PPPoE connection. If the correct information was provided, the PPPoE connection should be configured and the installer should be able to use it to connect to the Internet and retrieve packages over it (if needed). If the login information is not correct or some error appears, the installer will stop, but the configuration can be attempted again by selecting the menu entry Configure and start a PPPoE connection.

---

[2]The `ppp-udeb` component is loaded as one of the additional components in this step. If you want to install at medium or low priority (expert mode), you can also manually select the `ppp-udeb` instead of entering the "modules" parameter at the boot prompt.

Appendix E

文案

E.1 關於本文件

This manual was created for Sarge's debian-installer, based on the Woody installation manual for boot-floppies, which was based on earlier Debian installation manuals, and on the Progeny distribution manual which was released under GPL in 2003.

本文件由 DocBook XML 寫成。有很多程式可以使用 `docbook-xml` 和 `docbook-xsl` 套件中的資訊得到各種輸出格式。

為了提升本文件的可維護性，我們使用了一些 XML 的特性，例如 entities 和 profiling 屬性。它們充當類似於程式語言中變數與條件的角色。本文件的 XML 原始文件包含了各種硬體架構的資訊—profiling 屬性用於分開架構相關的文件片段。

E.2 幫助本文件

If you have problems or suggestions regarding this document, you should probably submit them as a bug report against the package `installation-guide`. See the `reportbug` package or read the online documentation of the Debian Bug Tracking System. It would be nice if you could check the open bugs against installation-guide to see whether your problem has already been reported. If so, you can supply additional corroboration or helpful information to XXXX@bugs.debian.org, where XXXX is the number for the already-reported bug.

更佳的途徑是取得一份本文件的 DocBook 原始文件，並且製作一個補丁。DocBook 的原始文件位於 installation-guide project on salsa。如果您不熟悉 DocBook，別發愁：在 manuals 目錄下有一個簡單的 cheatsheet 文件可以幫您開始。它像 html 文件，但更側重於文字的含義而不是示範。歡迎將補丁發送到 debian-boot 郵件論壇 (見下)。關於如何從 SVN 提出 (check out) 原始文件，請參考原始文件目錄中的 README。

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E.3 主要貢獻人員

This document was originally written by Bruce Perens, Sven Rudolph, Igor Grobman, James Treacy, and Adam Di Carlo. Sebastian Ley wrote the Installation Howto.

Miroslav Kuře has documented a lot of the new functionality in Sarge's debian-installer. Frans Pop was the main editor and release manager during the Etch, Lenny and Squeeze releases.

Many, many Debian users and developers contributed to this document. Particular note must be made of Michael Schmitz (m68k support), Frank Neumann (original author of the Amiga install manual), Arto Astala, Eric Delaunay/Ben Collins (SPARC information), Tapio Lehtonen, and Stéphane Bortzmeyer for numerous edits and text. We have to thank Pascal Le Bail for useful information about booting from USB memory sticks.

　　我們還從下列文件中取得了非常有用的文件和資訊，它們是 Jim Mintha's 的網路開機 HOWTO(沒有有效的 URL)，Debian 常見問答集，Linux/m68k 常見問答集，Linux for SPARC Processors 常見問答集，Linux/Alpha 常見問答集，以及其他。這些文件的維護者們提供了豐富的資訊，應該被大家認識。
　　本手冊中關於以 chroot 安裝的章節乃從版權所屬 Karsten M. Self 之文件中摘錄

E.4　商標確認

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Appendix F

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Version 2, June 1991

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type show w. This is free software, and you are welcome
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```

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