SUSE

使用 sudo 配置超级用户特权

内容

熟悉有关 **sudo** 配置的基础知识，并了解如何使用 **sudo** 委托超级用户特权。本文提供了深入的 **sudo** 配置信息，并未就如何构建全面安全的 **sudo** 策略提供任何建议。与安全相关的策略非常复杂，在很大程度上取决于它们是针对什么环境创建的。

原因

某些命令需要管理员或 `root` 特权。使用 **sudo**，可以将执行这些命令的特权委托给特定的用户或组。

工作量

读完本文最多需要 20 分钟。编写第一个 **sudo** 配置规则只需几分钟时间，但建立一个可在环境中正常运行的 **sudo** 配置需要相当长的时间，具体取决于设置复杂性。

目标

了解 **sudo** 配置的基本方面。掌握 **sudo** 配置的常见使用场景。了解如何在 **sudo** 设置中使用用户、用户组和别名。熟悉 **sudo** 最佳实践和查错技巧。

要求

- 基本了解 **sudo**。

- **root** 特权。有关如何以普通用户身份使用 **sudo** 的信息，请访问 https://documentation.suse.com/smart/systems-management/html/sudo-run-commands-as-superuser/index.html ↗。

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目录

1 **sudo** 配置简介

sudo 提供了一种安全有效的方式将超级用户特权委托给特定用户或组。

Linux 系统上的某些操作需要 root 或管理员特权。自行管理系统的家庭用户无需分配超级用户权限，因为在此场景下，管理员与普通用户为同一人。但一旦系统纳入到包含多个用户、用户组及主机的大型环境，就必须明确控制谁被允许在何处执行何种操作。与此同时，为所有用户和用户组提供完成其任务所需的必要权限也十分重要。

> ❗ **重要**
>
> 在 `sudo-policy-wheel-auth-self` 软件包所实施的新策略中，`wheel` 用户组用于确定用户是否可通过输入自身口令获取 root 权限。由 Agama 安装程序创建的第一个用户会自动加入 `wheel` 用户组。
>
> 此外，运行 **sudo** 命令时的规则如下：
>
> - 如果您属于 `wheel` 用户组，系统会提示您输入自身的用户口令。
>
> - 如果您不属于 `wheel` 用户组，系统会提示您输入 root 口令。

sudo 可提供以下优势：

增强的系统安全性

  sudo 提供对用户、组、主机和命令的精细控制，从而可以通过降低入侵者或系统用户恶意或意外造成损坏的风险，来提高系统安全性。

完整的审计追踪

  每当用户切换特权时，这种行为就会出现在系统日志中，并且该用户以提升的特权执行的所有操作都可以追溯到该用户。

委托 root 专属任务的方式

使用 **sudo**，系统管理员可以允许单个用户或组执行特定的任务，而无需输入 root 口令并切换到 root 帐户。

2 创建自定义 **sudo** 配置

您需要了解如何构建简单的示例自定义 **sudo** 配置并逐步扩展它。创建组并使用别名可使自定义配置保持精简且高效。

❗ 重要

从 SUSE Linux Enterprise Server 15 迁移时，系统中会存在 /etc/sudoers 文件。如果 /etc/sudoers 文件存在，/usr/etc/sudoers 文件将被忽略。只要用户未对 /etc/sudoers 文件进行重大修改，系统仍会读取 /etc/sudoers.d/ 目录下的配置。

从 SUSE Linux Enterprise Server 15 迁移时，建议未修改过 /etc/sudoers 文件的用户将其去除。如果用户已修改过 /etc/sudoers 文件，需先将修改后的文件移至 /etc/sudoers.d 目录，再去除原文件。

✋ 警告：示例配置仅用于演示目的

下面所述的示例规则仅用于演示目的。请使用这些示例来了解 **sudo** 配置文件的一般语法。不要在现实设置中使用它们，因为它们不能反映这些环境的复杂性。

2.1 **sudo** 配置最佳实践

在开始之前，请注意以下有关维护 **sudo** 配置的几条基本规则：

始终使用 `visudo -f` 命令编辑 `/etc/sudoers.d/` 目录

对 **sudo** 配置的任何更改都应使用 **visudo** 命令来进行。**visudo** 是一个定制的工具，可用于编辑 **sudo** 配置文件和运行基本语法检查，以确保配置保持完整且能正常运行。错误的 **sudo** 配置可能导致用户被锁定在自己的系统之外。

始终在 `/etc/sudoers.d/` 下创建自定义配置

自定义配置必须位于 `/etc/sudoers.d/` 目录下，**sudo** 才会拉取该配置。自定义配置文件中的设置优先于 `/usr/etc/sudoers` 包含的默认配置中的设置。

始终注意配置读取顺序

为确保以正确的顺序读取自定义配置，请在配置前面加上数字作为前缀。使用前导零来建立文件的读取顺序。例如，`01_myfirstconfig` 在 `10_myotherconfig` 之前分析。如果在某个文件中设置了一个指令，而该文件是在包含冲突信息的另一个文件之前读取的，则会应用最后读取的指令。

始终使用描述性文件名

使用能够提示配置文件作用的文件名。这可以帮助您跟踪 **sudo** 设置的预期功能。

2.2　创建用户特定的配置文件

创建一个 **sudo** 配置文件，以允许普通用户 (`tux`) 使用自己的口令（而不是 `root` 口令）运行 **useradd** 命令。

例 1：创建用户特定的配置文件

1. 以系统管理员 (`root`) 身份启动 **visudo**，创建一个用于保存新用户特定的指令的自定义配置文件。使用带编号的描述性名称：

   ```
   # visudo -f /etc/sudoers.d/02_usermanagement
   ```

2. 创建一条规则，以允许 `tux` 在此 **sudo** 配置应用到的整个环境中执行 **/usr/sbin/useradd** 二进制文件：

   ```
   tux ❶  ALL ❷  = /usr/sbin/useradd ❸
   ```

❶ 指定用户或组。按名称或 #UID 列出用户，按 %GROUPNAME 列出组。如果此处有多个项目，请用逗号分隔。要否定项，请使用！。

❷ 指定一个或多个主机（用逗号分隔）。使用完全限定的主机名或 IP 地址。添加 ALL 以在所有主机上全局强制实施此设置。使用！进行否定。

❸ 指定一个或多个可执行文件（用逗号分隔）。指定可执行文件时，请务必注意以下规则：

/usr/sbin/useradd
> 在不添加任何其他选项的情况下，此操作允许执行每个可能的 **useradd** 命令。

/usr/sbin/useradd -c
> 如果您明确指定某个选项，则该选项是唯一允许的选项。在上面指定的用户无法使用其他任何选项。

/usr/sbin/useradd ""
> 这样，用户只能单纯调用 **useradd**，而根本不能使用任何选项。

在上面的示例中，您可能希望允许使用所有选项和子命令，或者出于安全原因将允许的选项和子命令限制为少数几个，但在这种情况下，完全禁止用户指定任何选项是毫无意义的。

3. 保存配置，退出编辑器，并打开另一个外壳来测试 **sudo** 是否遵循您的新配置。

2.3　通过对项目进行分组来创建自定义配置

修改例 1 "创建用户特定的配置文件"中的配置，使一组命名用户无需输入 root 口令即可运行 **useradd** 命令。另外，将 **usermod** 和 **userdel** 添加到此组可用的命令列表中。

例 2：通过对项目进行分组来创建自定义配置

1. 要修改示例配置，请以系统管理员身份使用 **visudo** 将其打开：

```
# visudo /etc/sudoers.d/02_usermanagement
```

2. 使用逗号分隔的列表将更多用户添加到规则：

```
tux, wilber ALL = /usr/sbin/useradd
```

3. 要允许列出的用户执行一系列命令，请将这些命令指定为逗号分隔的列表：

```
tux, wilber ALL = /usr/sbin/useradd, /usr/sbin/usermod, /usr/sbin/userdel
```

4. 保存配置，退出编辑器，并打开另一个外壳来测试 **sudo** 是否遵循您的新配置。

2.4 通过应用别名简化配置

使用别名可以进一步简化例 2 "通过对项目进行分组来创建自定义配置"中的自定义配置。对项目进行分组在一定程度上有所帮助，但使用用户、命令和主机的全局别名是使 **sudo** 配置保持整洁精简的最有效方法。

使用别名和组（而不是列表）是应对环境设置变更的更优方式。例如，当某用户离职时，无需逐一检查所有独立的自定义配置文件，只需在别名声明文件的全局 User_Alias 声明中去除该用户即可。该过程同样适用于任何其他类型的别名（Host_Alias、Cmnd_Alias 和 Runas_Alias）。

例 3：通过应用别名简化配置

1. 创建一个新文件来保存全局别名定义：

```
# visudo /etc/sudoers.d/01_aliases
```

2. 添加以下一行内容以创建 TEAMLEADERS 别名：

```
User_Alias    TEAMLEADERS = tux, wilber
```

3. 添加以下一行内容以创建 USERMANAGEMENT 别名：

```
Cmnd_Alias    USERMANAGEMENT = /usr/sbin/useradd, /usr/sbin/usermod, /usr/sbin/userdel
```

4. 保存更改并退出 **visudo**。

5. 以系统管理员身份启动 **visudo** 以编辑示例配置文件：

```
# visudo -f /etc/sudoers.d/02_usermanagement
```

6. 删除先前的规则并将其替换为以下规则，该规则使用您刚刚定义的别名：

```
TEAMLEADERS ALL = USERMANAGEMENT
```

7. 保存配置，退出编辑器，并打开另一个外壳来测试 **sudo** 是否遵循您的新配置。

✏️ 注意：更多信息

在第 7 节 "**sudo** 配置参考" 中查找 **sudo** 配置语法的更详细说明，并参见 **sudo** 的手册页。

3   更改 **sudo** 口令提示超时

了解如何更改超时设置，以便在执行需要 root 特权的命令时，不会每执行一个命令都出现输入 root 口令的提示。

首次运行以 **sudo** 开头的命令时，系统会提示您输入 root 口令。该口令将会在一段时间内保持有效。一旦口令失效，系统会再次提示用户输入口令。要延长或缩短在执行需要 root 特权的命令时实施的超时，请对 **sudo** 配置文件进行以下更改。请务必注意，虽然系统提示用户输入 root 口令，但他们并不属于 wheel 用户组。

✋ 警告：不要向 root 特权授予不受限的无口令访问权限

出于安全原因，请不要向 root 特权授予不受限的访问权限。相反，请设置合理的超时，以防任何入侵者滥用 root 帐户。

过程 1：**更改 sudo 口令提示的超时**

1. 以系统管理员身份，使用以下命令为时戳配置创建一个新的 **sudo** 配置文件：

```
# visudo --f=/etc/sudoers.d/timestamp_timeout
```

使用 root 口令成功完成身份验证后，将打开该文件。

2. 启用编辑功能并添加 `timestamp_timeout=` 一行。输入时戳值。

   例如，要将超时缩短为三分钟，请输入：

   ```
   Defaults timestamp_timeout=3
   ```

   如果时戳设置为零，则每次执行 **sudo** 命令时，系统都会提示您输入 root 口令。

3. 保存更改并关闭该文件。

您已创建 **sudo** 配置文件，并缩短了执行 **sudo** 命令的超时设置。

4 使用 root 特权启动外壳

使用 **sudo -s** 或 **sudo -i** 命令以永久性 root 特权启动外壳。使用这两个命令时，系统只会提示您输入 root 口令一次。请务必注意，如果用户属于 `wheel` 用户组，系统会提示他们输入自己的口令。否则，系统会提示其输入 root 口令。

4.1 **sudo -s** 与 **sudo -i** 的区别

如果每次以 root 身份运行命令都必须输入 **sudo**，您可能会觉得非常不便。您可以使用一个内置机制来以永久性 root 特权启动外壳。为此可以使用两个命令选项：

- **sudo -s** 使用当前用户的环境启动外壳，并提供几个特权控制措施。要运行此命令，请输入 root 口令。

- **sudo -i** 使用干净的环境将外壳作为交互式登录外壳启动。要运行此命令，请输入 root 口令。

使用这两个命令时，外壳将通过新环境启动，您将以 root 身份登录。在该外壳中执行的任何后续命令都将以提升的特权运行，您无需再次输入口令。当您关闭外壳时，此环境将会终止，在执行另一个 **sudo** 命令时，您必须再次输入口令。

4.2   使用 **sudo -s** 启动外壳

sudo -s 命令启动交互式非登录外壳。使用 root 口令成功完成身份验证后，所有后续命令都将以提升的特权执行。

SHELL 环境变量或用户的默认外壳指定了要打开哪个外壳。如果此变量为空，则会选取 /etc/passwd 中定义的外壳。

默认情况下，**sudo -s** 命令从前一用户的目录运行，因为目标用户会继承前一用户的环境。该命令还会记录到您的历史中。

要以永久提升的特权启动外壳，请输入以下命令：

```
tux:~ > sudo -s
[sudo] password for root:
root:/home/tux # exittux:~ >
```

提示符从 > 更改为 # 。

您已使用永久提升的特权启动了外壳。执行所有后续命令时，系统不会再次提示输入口令。

4.3   使用 **sudo -i** 启动外壳

sudo -i 与 **sudo -s** 命令行选项类似，但它会启动交互式登录外壳。使用 **sudo -s** 命令时，目标用户将继承前一用户的环境。您可以使用 **sudo -i** 命令来防止出现这种情况，运行此命令后，目标用户将获得一个干净的环境，并可以在他们自己的 $HOME 目录开始工作。

要使用 **sudo -i** 运行命令，请输入以下命令：

```
tux:~ > sudo -i
[sudo] password for root:
root:~ # exittux:~ >
```

您已使用永久提升的特权启动了外壳，并且命令已记录到您的历史记录中。执行所有后续命令时，系统不会再次提示输入口令。

5 **sudo** 最佳实践

了解 **sudo** 的一些最佳实践，以控制系统访问权限并提高用户的工作效率。

对 sudo 配置进行全面测试和审计

要构建真正高效且安全的 **sudo** 配置框架，请制定例行性的定期测试和审计流程。找出可能的漏洞并予以处理。不要出于便利而疏忽安全。

限制 sudo 超时

出于安全原因，请不要向 root 特权授予不受限的访问权限。相反，请设置合理的超时，以防任何入侵者滥用 root 帐户。有关详细信息，请参见第 3 节 "更改 **sudo** 口令提示超时"。

使用 visudo 命令

使用 **visudo -f** 命令可以安全地编辑 /usr/etc/sudoers 文件，因为它会在保存更改之前检查文件的语法。这是一种预防措施，旨在纠正任何可能破坏系统的错误。除了基本的语法检查之外，您还可以运行 **visudo -c** 来检查整个 **sudo** 配置框架是否以正确的顺序进行解析，且不包含错误。

按组而不是按个人管理用户

尽可能使 **sudo** 配置保持精简且易于管理。应采用以下方式来管理用户：将用户添加到组，然后向这些组而不是个人授予特权。这样可以方便地通过更改组设置来添加或去除用户，而不必在整个配置中查找用户。

允许示例 %admingrp 组中的所有用户执行所有命令的示例规则：

```
%admingrp ALL = (ALL) ALL
```

限制二进制文件的路径

使用 secure_path 指令限制用户可以在哪些区域执行命令。以下示例是 SUSE Linux Enterprise Server 随附的默认设置。

```
Defaults secure_path="/usr/sbin:/usr/bin:/sbin:/bin:/usr/local/bin:/usr/local/sbin"
```

使用 **sudo** 配置超级用户特权

保持 sudo 日志记录透明

> sudo 记录到标准日志文件，但其中的日志项很容易被忽略。将以下规则添加到您的配置，以指定专用的 sudo 日志文件。

```
Defaults logfile=/var/log/sudo.log
```

6 查错

了解如何对 sudo 配置问题进行调试和查错。

6.1 /etc/sudoers.d/ 下的自定义配置被忽略

/etc/sudoers 中的 #includedir 指令会忽略以 ~ 字符结尾或包含 . 字符的文件。这是为了避免软件包管理器提供的配置文件（包含 .）或编辑器的临时文件或备份文件（以 ~ 结尾）出现问题。请确保自定义配置文件的名称既不包含这些字符，也不以这些字符结尾。如果存在这种情况，请重命名这些文件。

6.2 自定义指令冲突

配置文件的读取顺序决定了何时应用 sudo 配置指令。/etc/sudoers.d/ 下的文件中的指令优先于 /etc/sudoers 中的相同指令。如果 /etc/sudoers.d/ 中指定的自定义指令不起作用，请使用 visudo -c 检查文件的读取顺序。根据需要调整顺序。

6.3 由于 sudo 配置损坏而被锁定

如果您不小心破坏了系统的 sudo 配置，因而将自己锁定在 sudo 之外，可以使用 su - 和 root 口令来启动 root 外壳。运行 visudo -c 以检查错误，然后使用 visudo 修复错误。

7 **sudo** 配置参考

本章提供基本的 **sudo** 配置参考，以帮助您了解和维护默认和自定义的 **sudo** 配置。

7.1 sudoers 配置语法

sudoers 配置文件包含两种类型的选项：字符串和标志。字符串可以包含任何值，而标志则只能在"ON"或"OFF"之间切换。sudoers 配置文件的最重要语法构造如下：

```
# Everything on a line after # is ignored ❶
Defaults !insults # Disable the insults flag ❷
Defaults env_keep += "DISPLAY HOME" # Add DISPLAY and HOME to env_keep ❸
tux ALL = NOPASSWD: /usr/bin/frobnicate, PASSWD: /usr/bin/journalctl ❹
```

❶ 存在两个例外：#include 和 #includedir 是普通命令。较新版本不再使用 #。取而代之的是，include 指令现在前面带有 @。为了向后兼容，仍支持 # 表示法。

❷ 去除！字符会将所需标志设置为 ON。

❸ 指定在启用 env_reset 时应保留的环境变量列表。

❹ 一个复杂的规则，规定用户 tux 必须输入口令才能运行 **/usr/bin/journalctl**，但不需要输入口令即可在所有主机上运行 **/usr/bin/frobnicate**。

有用的标志和选项

env_reset

> 如果设置，**sudo** 会构造一个具有
> TERM、PATH、HOME、MAIL、SHELL、LOGNAME、USER、USERNAME 和 SUDO_* 的极简环境。此外，会从调用环境导入 env_keep 中列出的变量。默认值为"ON"。
>
> ```
> Defaults env_reset # Turn env_reset flag ON
> ```

env_keep

> 当 env_reset 标志为 ON 时要保留的环境变量列表。
>
> ```
> # Set env_keep to contain EDITOR and PROMPT
> Defaults env_keep = "EDITOR PROMPT"
> ```

```
Defaults env_keep += "JRE_HOME" # Add JRE_HOME
Defaults env_keep -= "JRE_HOME" # Remove JRE_HOME
```

env_delete

当 env_reset 标志为 OFF 时要去除的环境变量列表。

```
# Set env_delete to contain EDITOR and PROMPT
Defaults env_delete = "EDITOR PROMPT"
Defaults env_delete += "JRE_HOME" # Add JRE_HOME
Defaults env_delete -= "JRE_HOME" # Remove JRE_HOME
```

7.2 基本 sudoers 规则

每条规则都遵循以下模式（[] 标记的是可选部分）：

```
#Who       Where        As whom     Tag               What
User_List Host_List = [(User_List)] [NOPASSWD:|PASSWD:] Cmnd_List
```

SUDOERS 规则语法

User_List

一个或多个标识符（用逗号分隔）：用户名、%GROUPNAME 格式的组，或 #UID 格式的用户 ID。可以使用！前缀指定求反。

Host_List

一个或多个标识符（用逗号分隔）：完全限定的主机名或 IP 地址。可以使用！前缀指定求反。Host_List 的常用选项为 ALL。

NOPASSWD:|PASSWD:

如果用户在 NOPASSWD: 后面运行的命令与 Cmd_List 匹配，系统不会提示用户输入口令。

PASSWD: 为默认选项。仅当 PASSWD: 和 NOPASSWD: 位于同一行时，才需要指定此选项：

```
tux ALL = PASSWD: /usr/bin/foo, NOPASSWD: /usr/bin/bar
```

Cmnd_List

一个或多个说明符（用逗号分隔）：可执行文件的路径，后接允许的可选参数。

```
/usr/bin/foo     # Anything allowed
/usr/bin/foo bar # Only "/usr/bin/foo bar" allowed
/usr/bin/foo ""  # No arguments allowed
```

`ALL` 可以用作 `User_List`、`Host_List` 和 `Cmnd_List`。

7.3　使用别名简化 sudoers

管理员可以通过在组项目中引入别名，来避免维护一组重复的规则或逐个地维护规则。别名的语法与规则的语法相同。支持以下类型的别名：

`User_Alias`
　　用户名列表

`Runas_Alias`
　　按 UID 划分的用户组

`Host_Alias`
　　主机名列表

`Cmnd_Alias`
　　命令、目录和别名的列表

将别名视为用户、组、命令和主机的命名列表。以下示例展示了别名的强大作用：

```
Host_Alias    WEBSERVERS = www1, www2, www3 ❶
User_Alias    ADMINS = tux, wilber, suzanne ❷
Cmnd_Alias    REBOOT = /sbin/halt, /sbin/reboot, /sbin/poweroff ❸
ADMINS WEBSERVERS = REBOOT ❹
```

❶　这三个服务器已分组到一个 Host_Alias `WEBSERVERS`。您可以使用完全限定的主机名或 IP 地址。

❷　与上面分组的主机类似，此处列出了组用户甚至用户组（例如 `%wheel`）。像往常一样，否定是通过 `!` 前缀实现的。

❸　指定在同一上下文中使用的一组命令。

④ 所有别名包含在一条规则中，该规则规定，`User_Alias` 指定的所有用户都可以在 `Host_Alias` 中命名的所有主机上执行 `Cmnd_Alias` 下指定的一组命令。

概括而言，别名可帮助管理员保持 `sudoers` 精简且易管理（因此保持其安全性）。例如，如果某个用户离职，您只需从 `User_Alias` 语句以及此人所属的任何系统组中删除此人的姓名一次，而不必搜索包含此特定用户的所有规则。

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