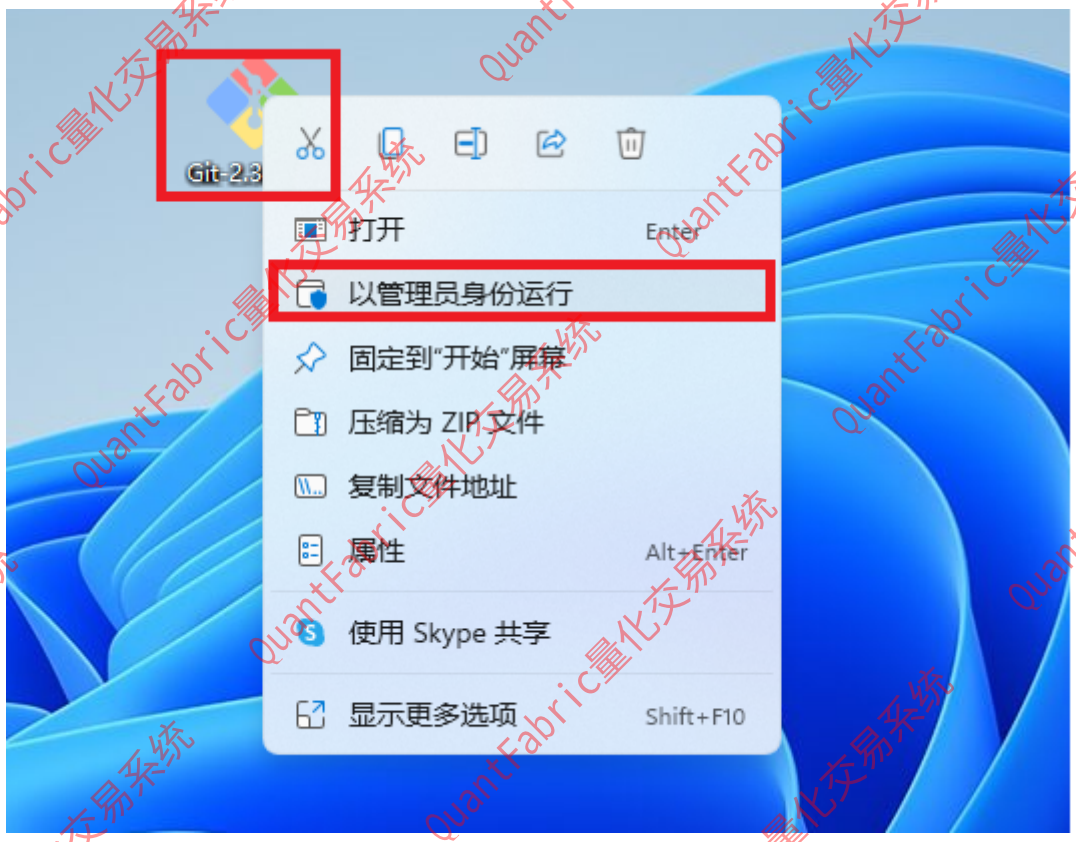
QuantFabric——开发环境搭建

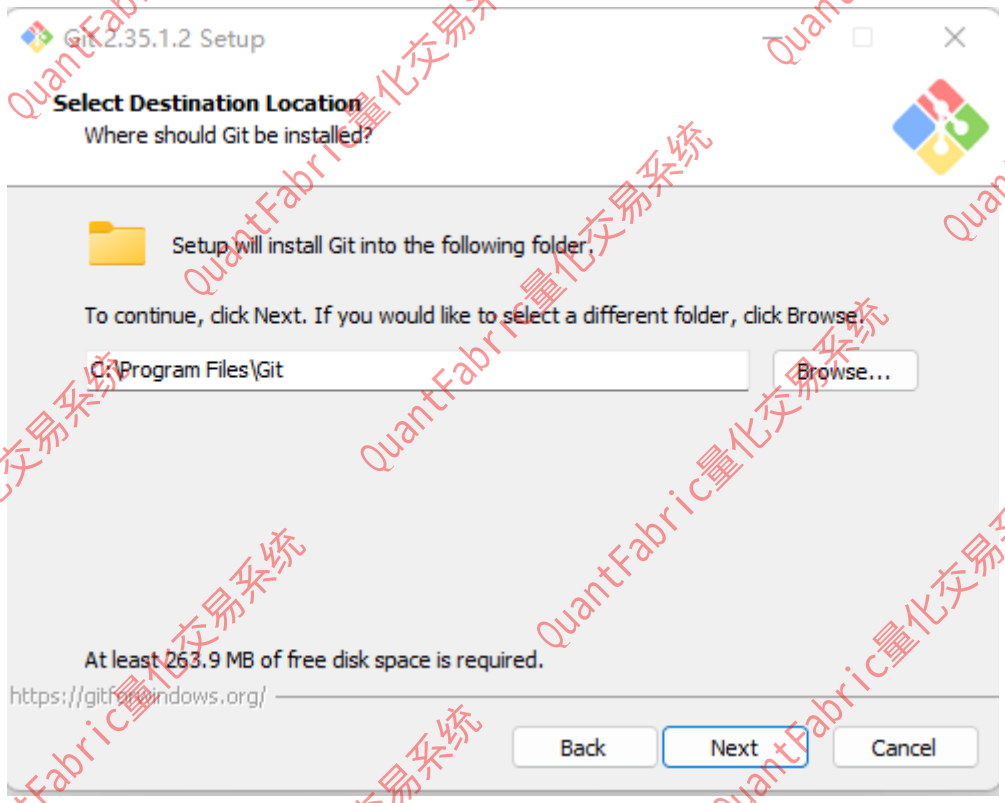
一、GitBash

- Git客户端提供了GUI客户端模块和GitBash模块。
- Git客户端下载地址：[git-scm](git-scm)
- git-bash安装流程如下：
  - 鼠标右键点击exe安装程序，使用管理员安装程序。

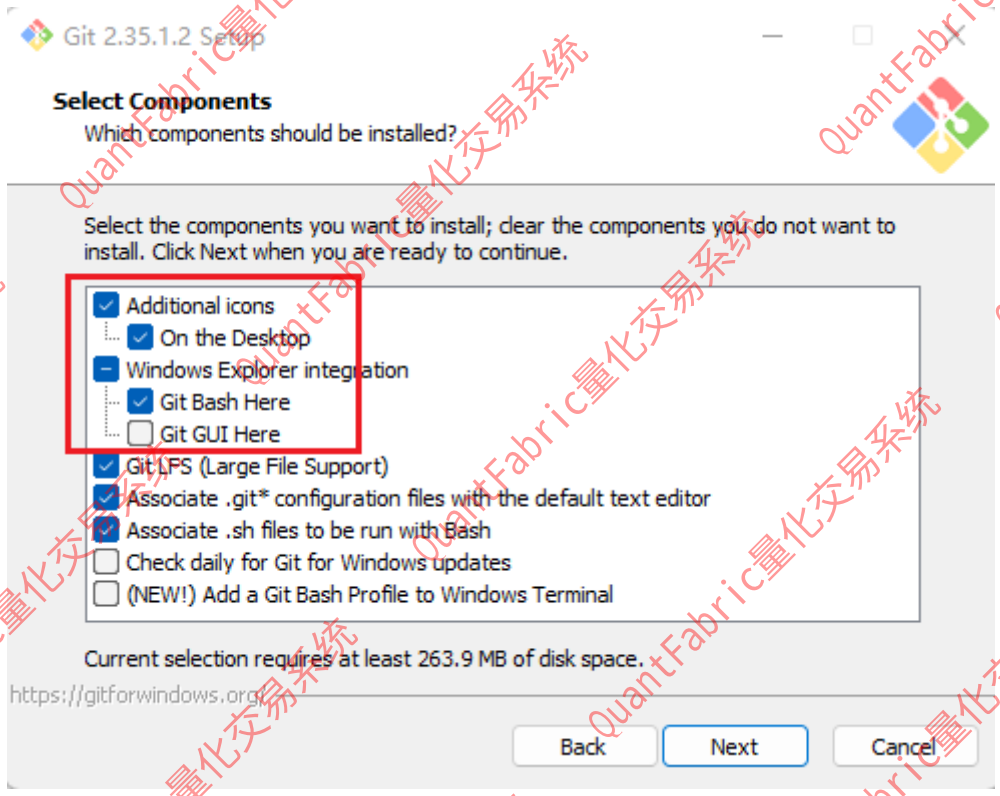


  - 选择下一步：

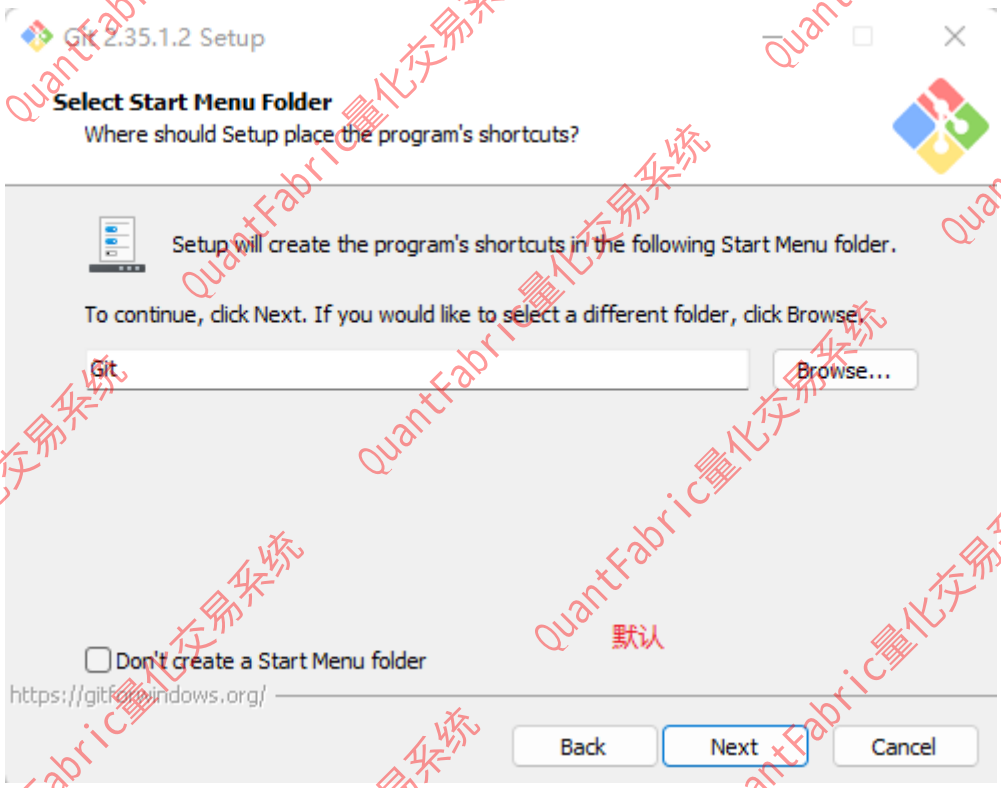
- 选择安装路径：



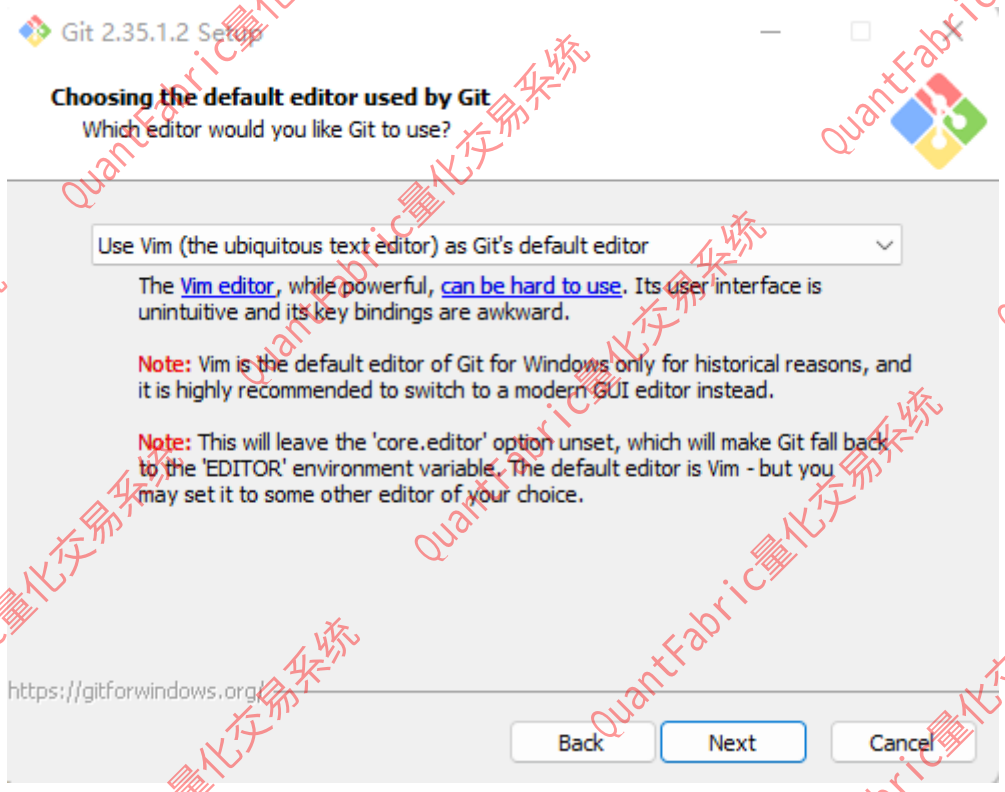
- 选择安装组件：



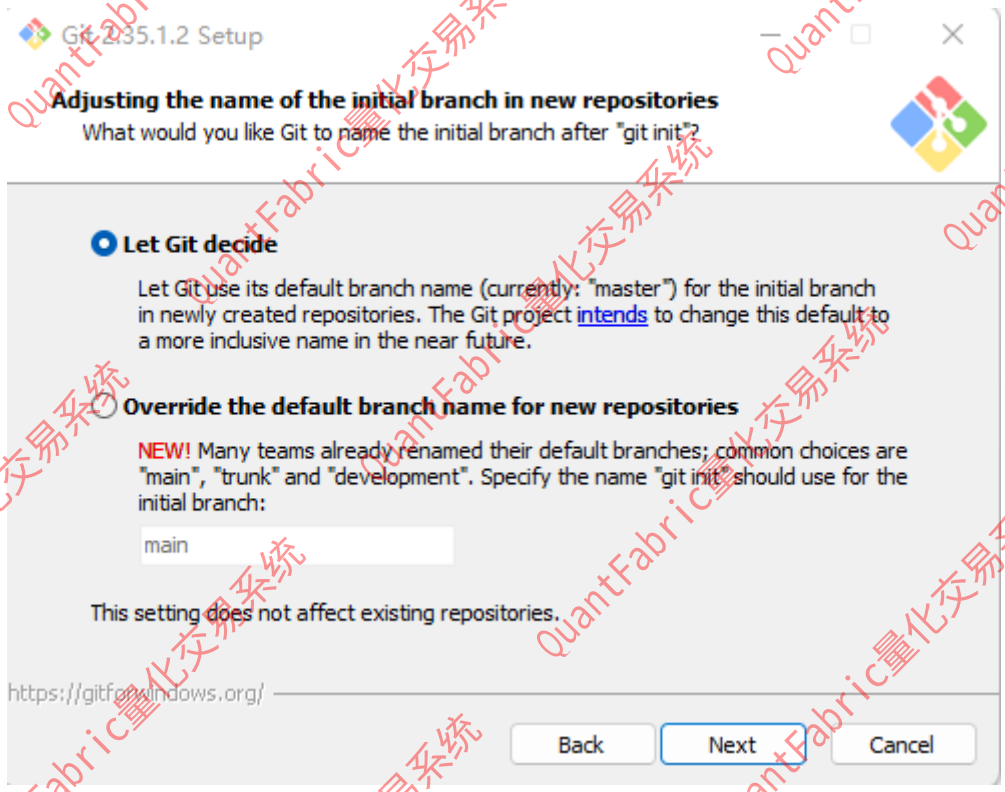
- 选择开始菜单设置：



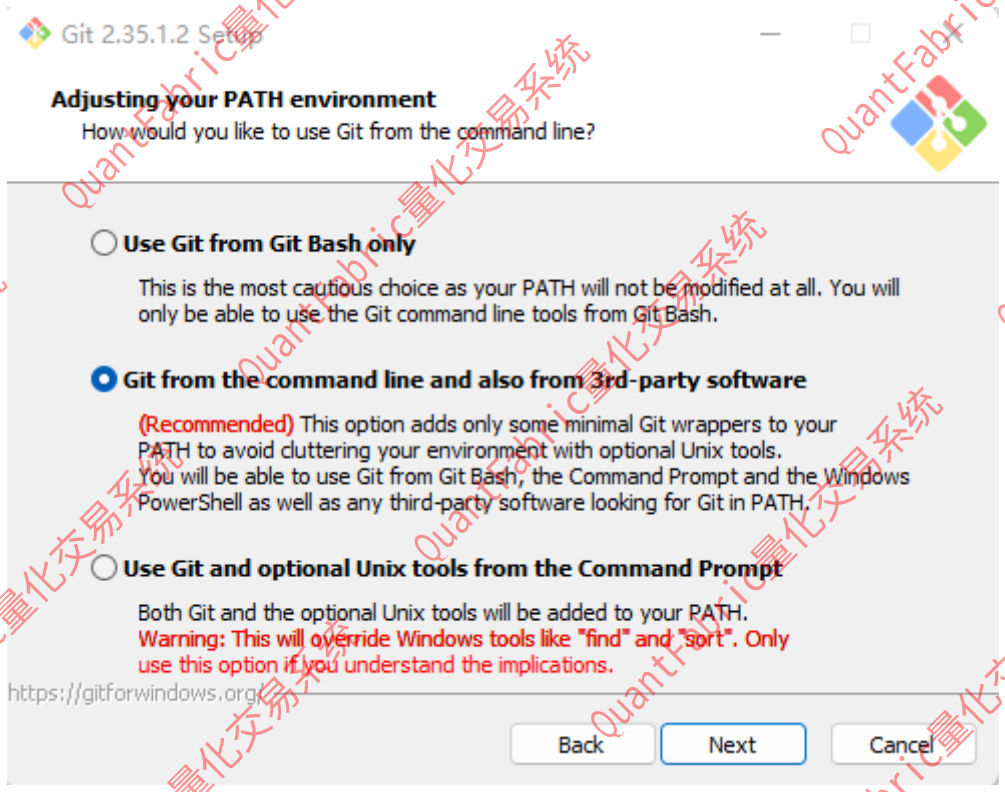
- 设置gitbash编辑器：



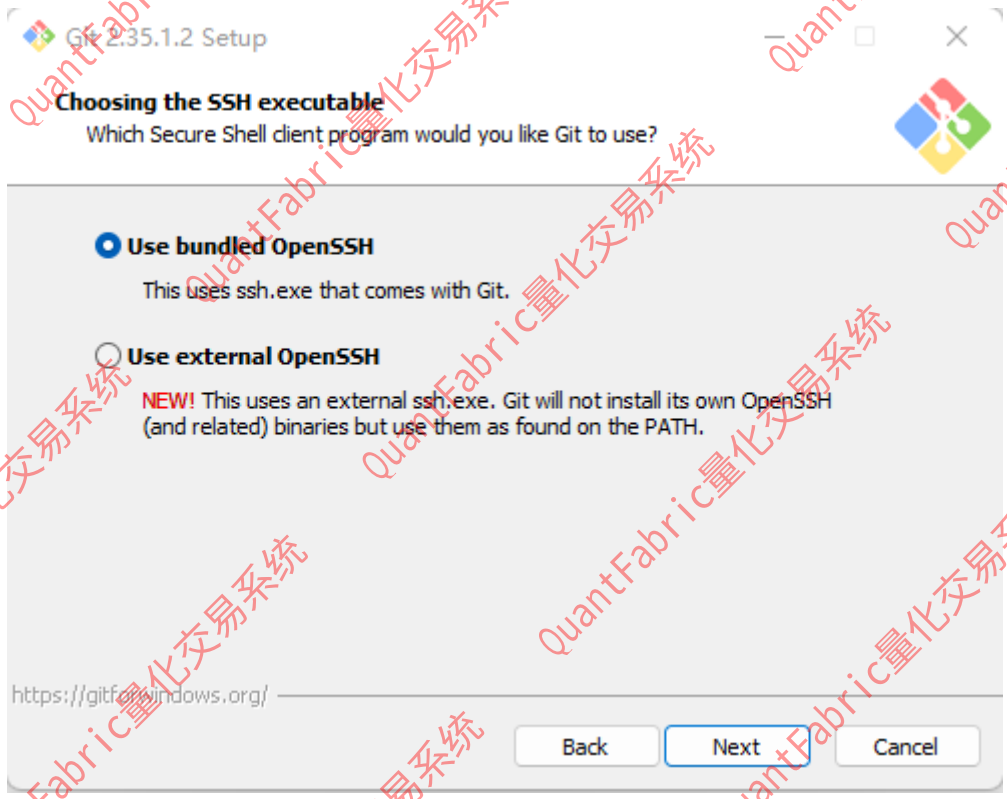
- git版本库初始化分支设置：



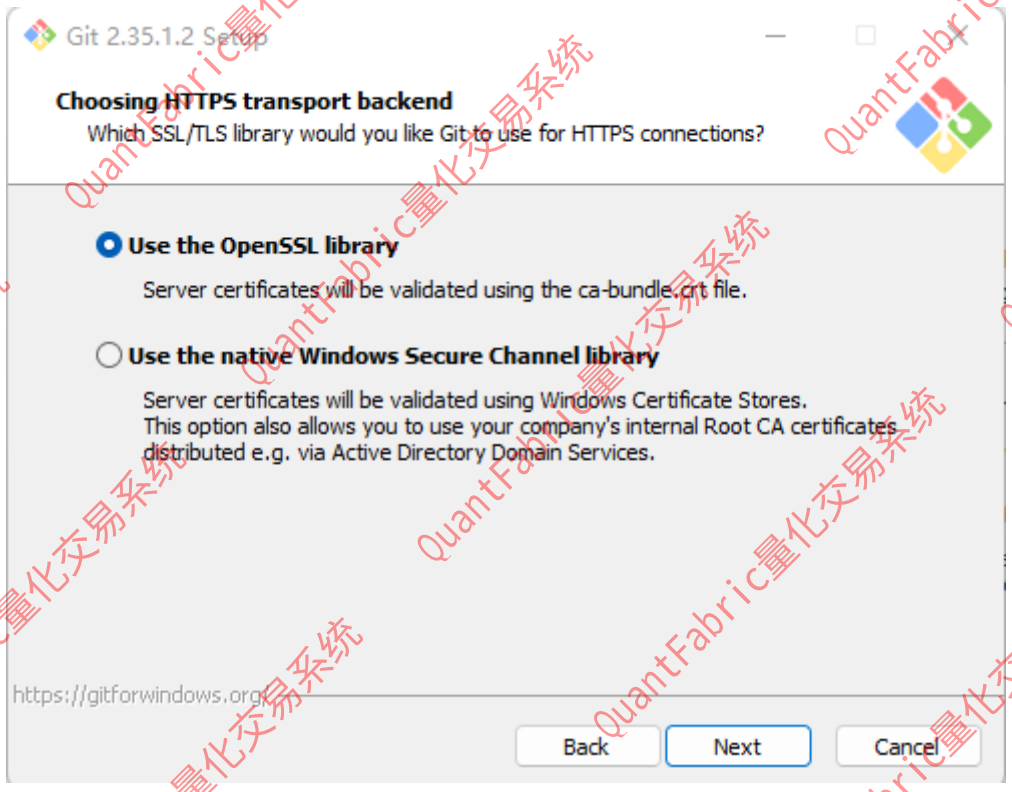
- git环境变量设置：



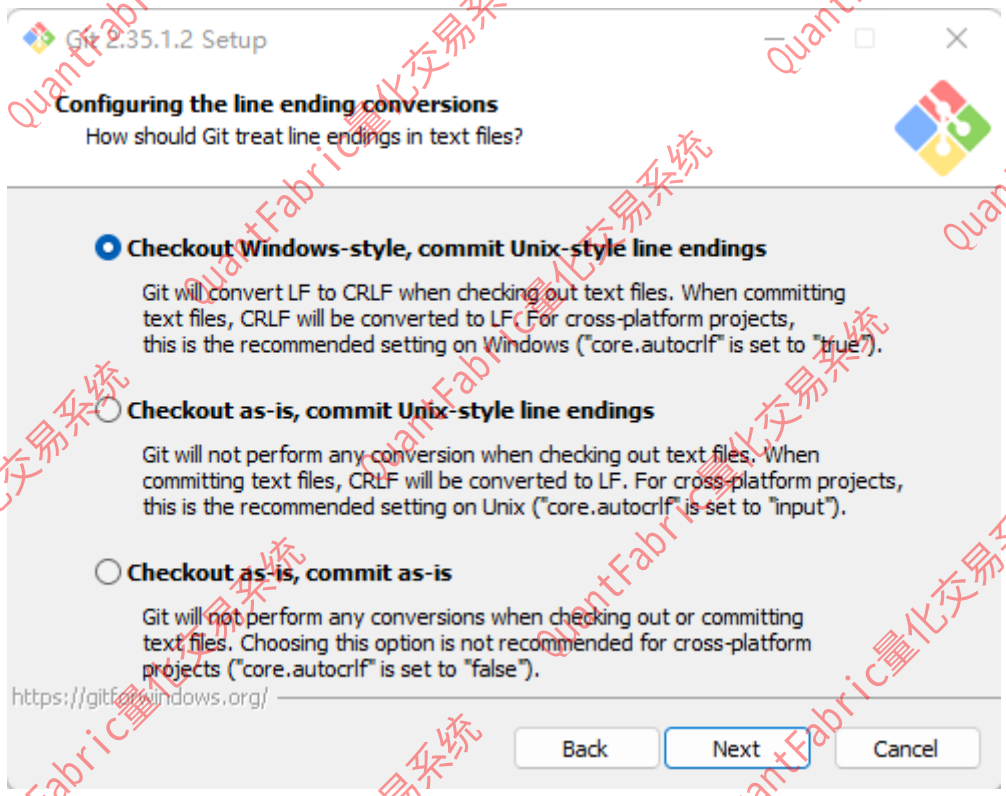
- 选择gitbash的ssh工具：



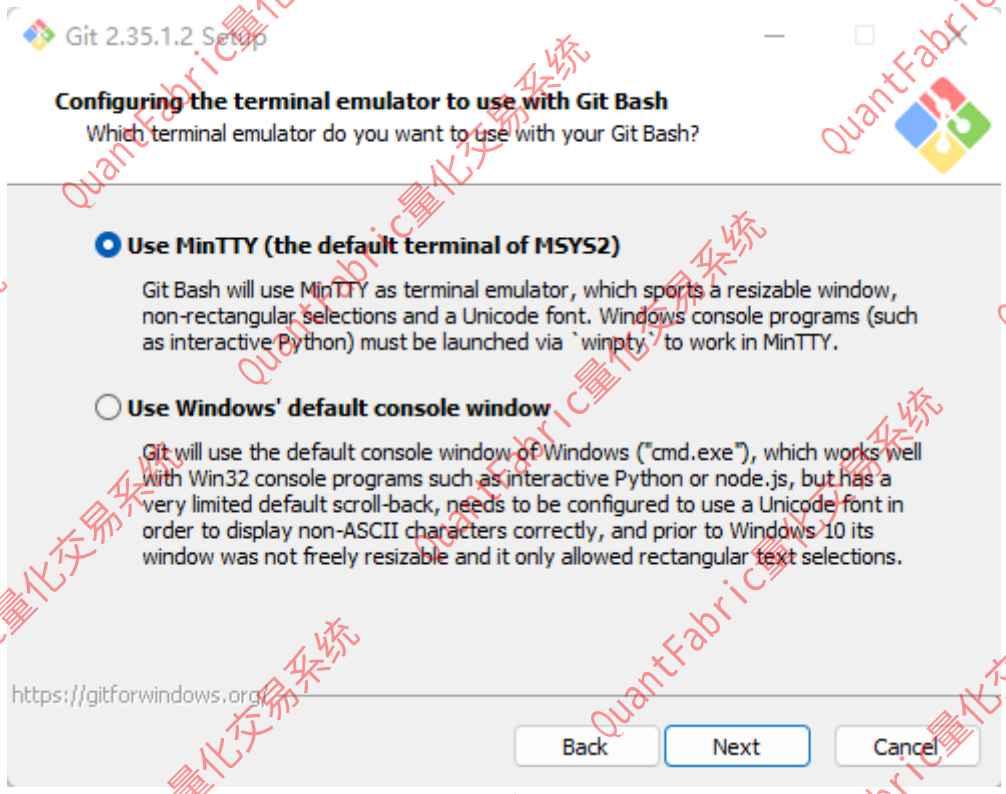
- 选择SSL库：



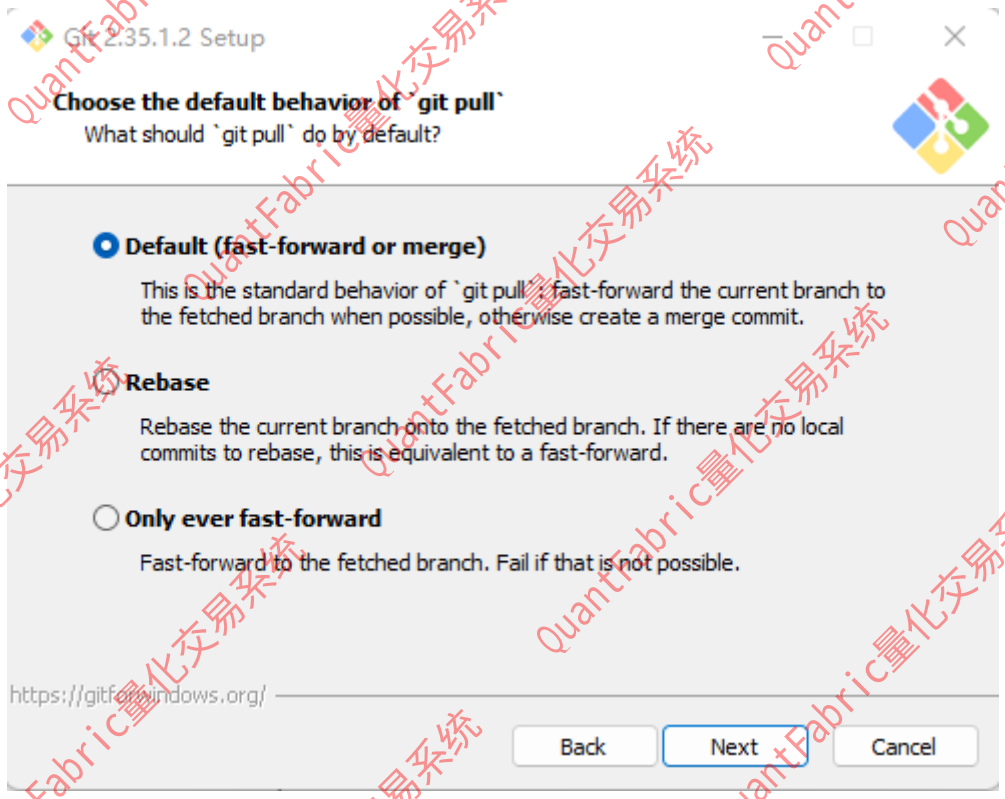
- 选择行结束符：



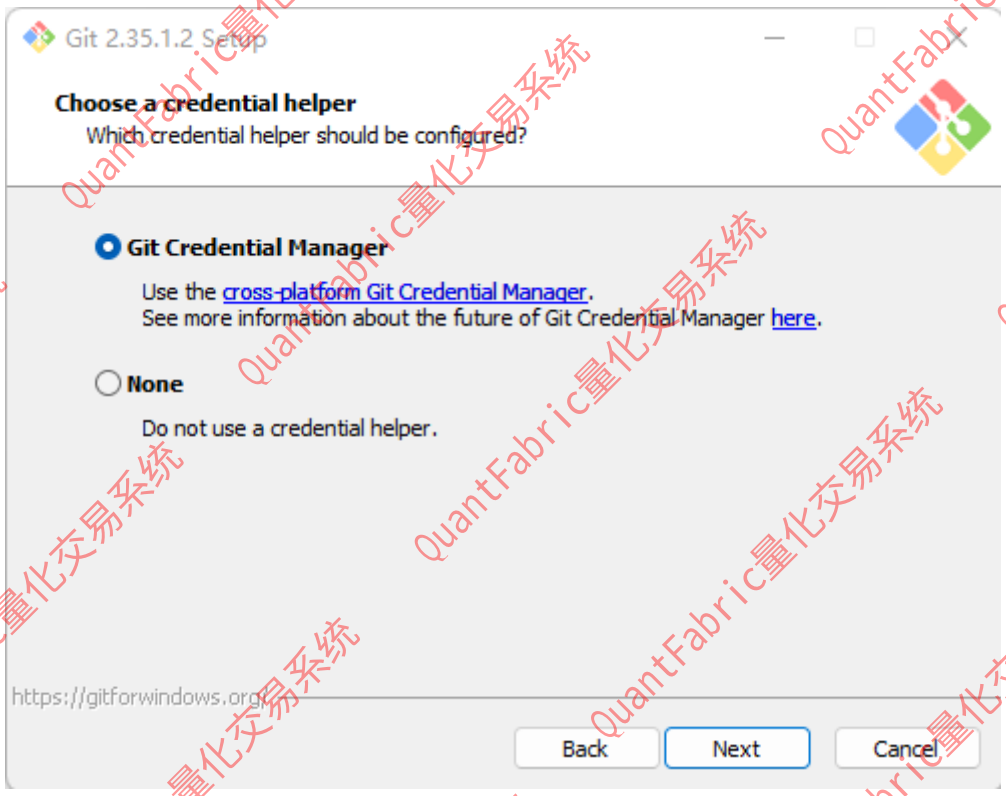
- 配置GitBash终端：



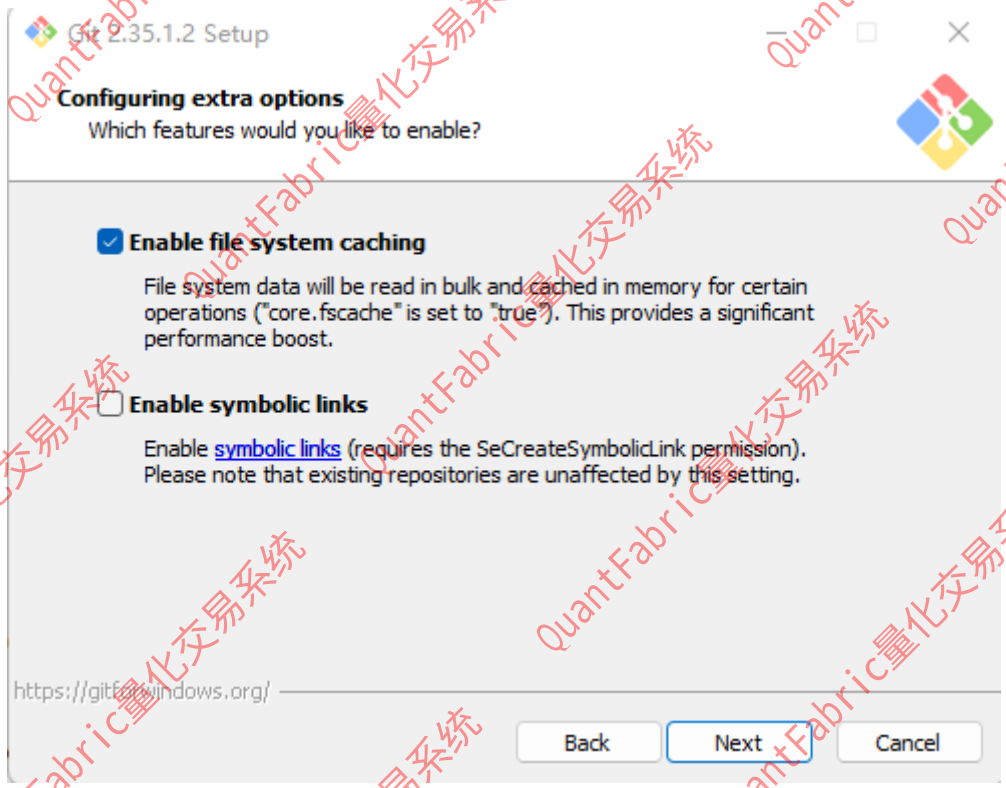
- 设置git pull默认分支合并策略：



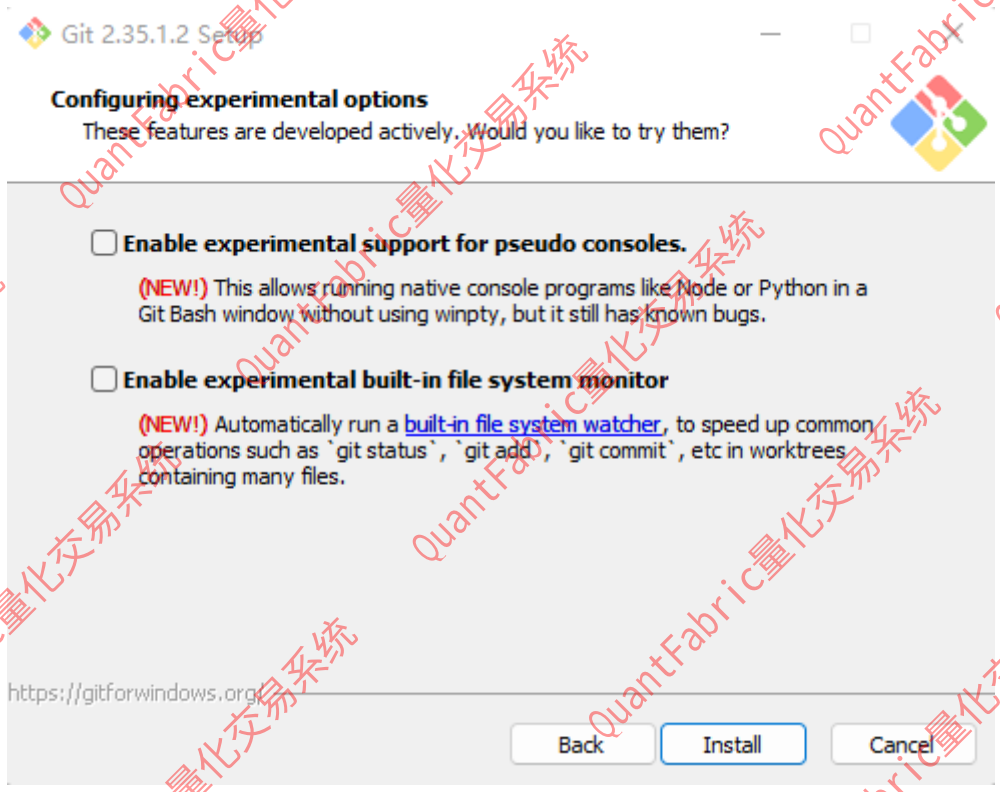
- 配置Git身份认证管理：



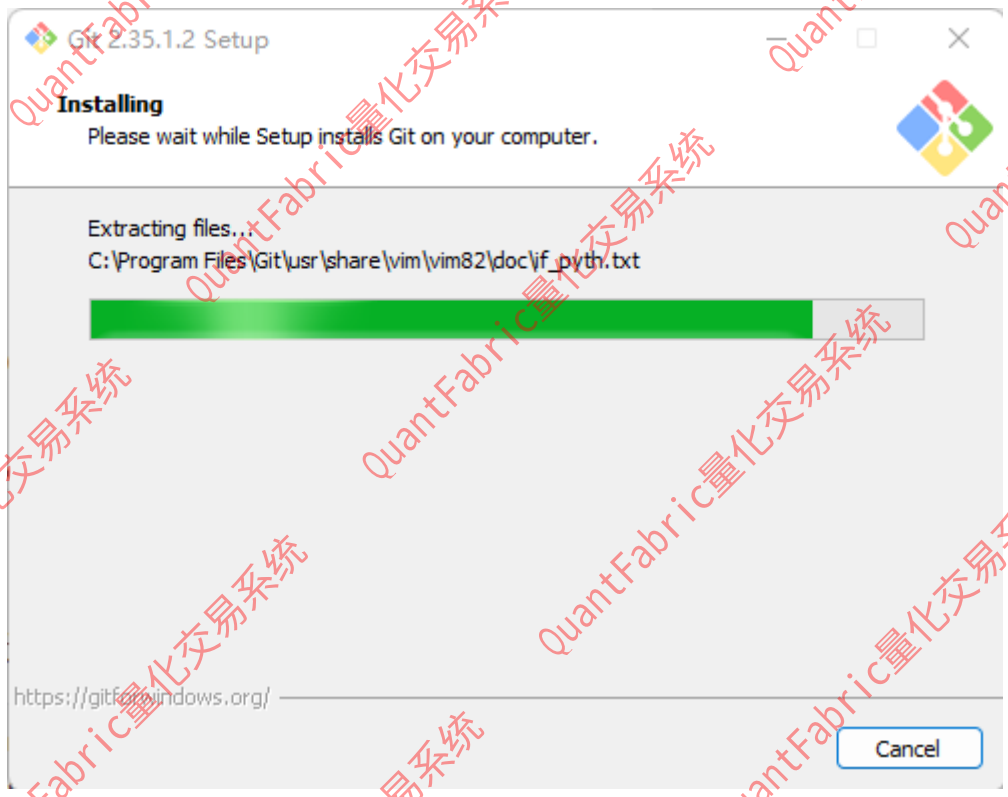
- 配置其它选项：



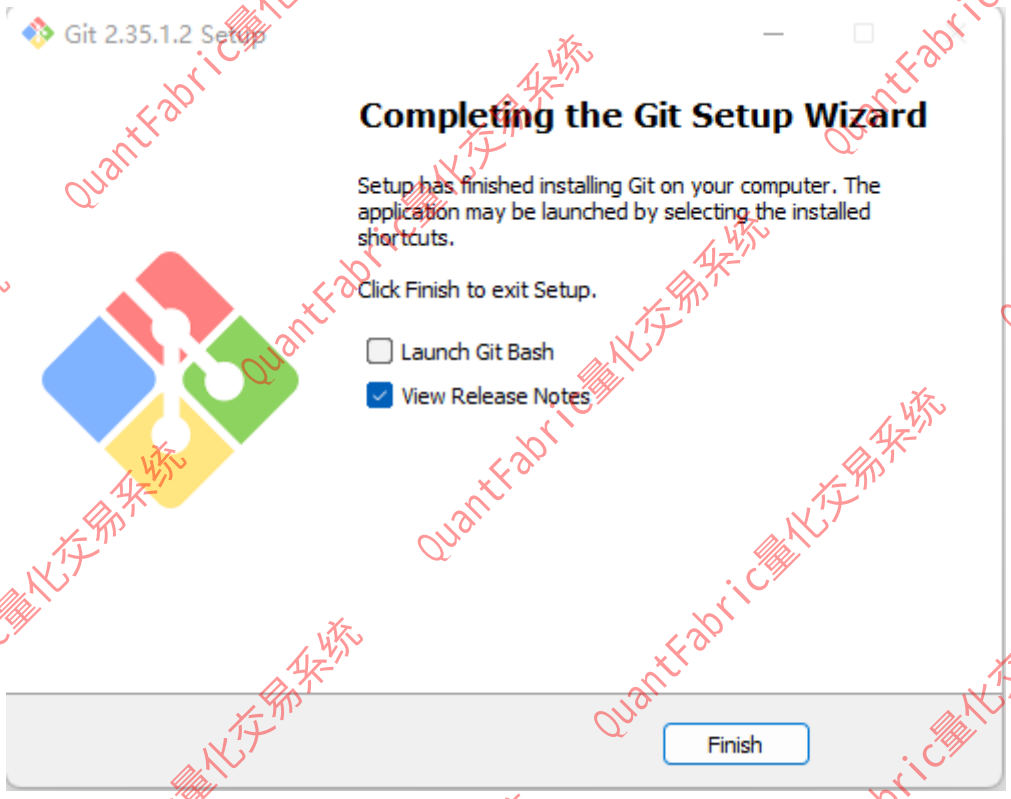
- 配置体验新功能：


Git 2.35.1.2 Setup
Configuring experimental options
These features are developed actively. Would you like to try them?
Enable experimental support for pseudo consoles.
(NEW!) This allows running native console programs like Node or Python in a Git Bash window without using winpty, but it still has known bugs.
Enable experimental built-in file system monitor
(NEW!) Automatically run a built-in file system watcher, to speed up common operations such as `git status`, `git add`, `git commit`, etc in worktrees containing many files.
https://gitforwindows.org/
Back
Install
Cancel

- 执行安装：


Git 2.35.1.2 Setup
Installing
Please wait while Setup installs Git on your computer.
Extracting files...
C:\Program Files\Git\usr\share\vim\vim82\doc\if_pyth.txt
https://gitforwindows.org/
Cancel

- 安装完成：



- 鼠标右键或点击桌面GitBash开启GitBash使用：

- Git学习文档：ProGit

二、SSH工具

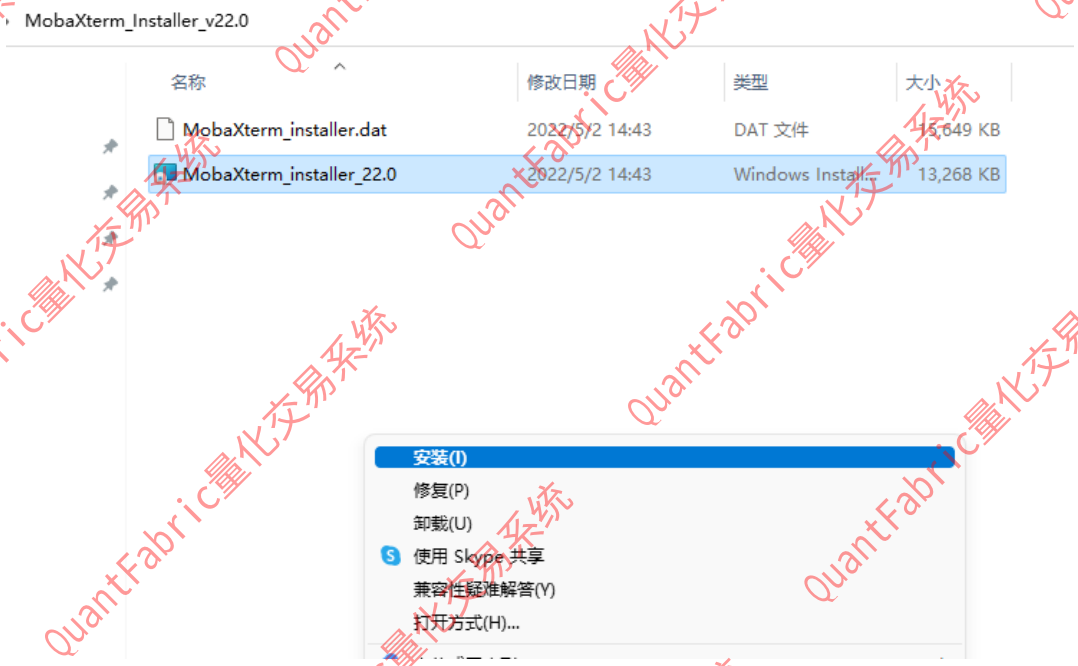
1、SSH工具

- FinalShell：国产SSH工具，支持MAC、Windows、Linux平台，支持批量服务器管理、实时硬盘监控、进程监控，支持SSH和Windows远程桌面。
- MobaXterm：MobaXterm提供了所有重要的远程网络工具（如SSH、X11、RDP、VNC、FTP、MOSH等）以及Windows 桌面上的Unix命令（bash、ls、cat、sed、grep、awk、rsync等），登录后默认开启sftp模式，仅支持Windows。
- Putty：Putty是最简单轻量级的SSH工具，无需安装，支持多系统版本。
- SecureCRT：SecureCRT是一款功能强大的付费SSH工具，支持Windows、Mac、Linux、IOS等平台。SecureCRT除了包括一般工具都有的特点外，还包括自动注册、对不同主机保持不同的特性、

打印功能、颜色设置、可变屏幕尺寸、用户定义的键位图等功能。

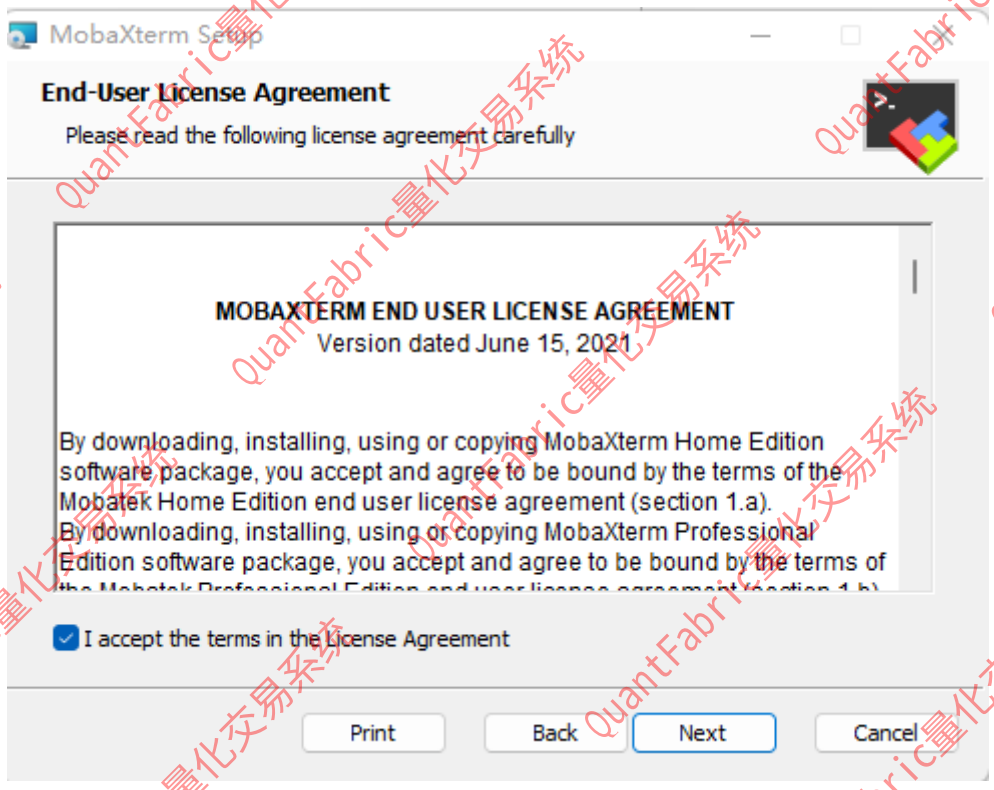
2、MobaXterm

- MobaXterm下载：MobaXterm
- MobaXterm安装流程：
  - 解压MobaXterm安装包将进行安装：

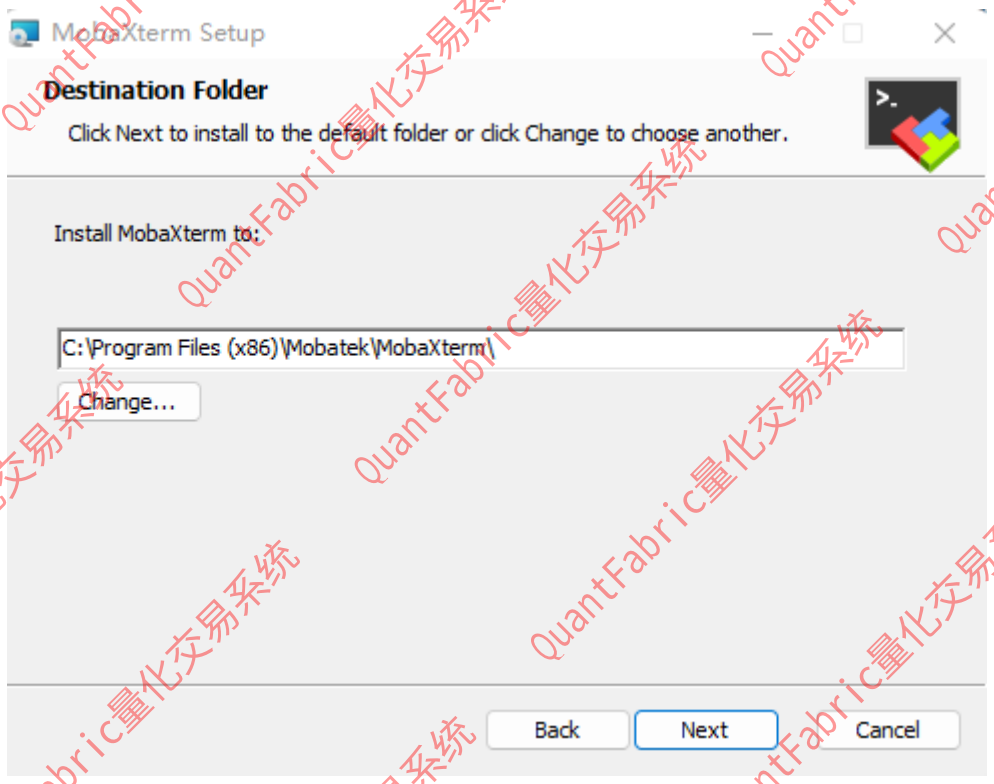


  - 安装设置：

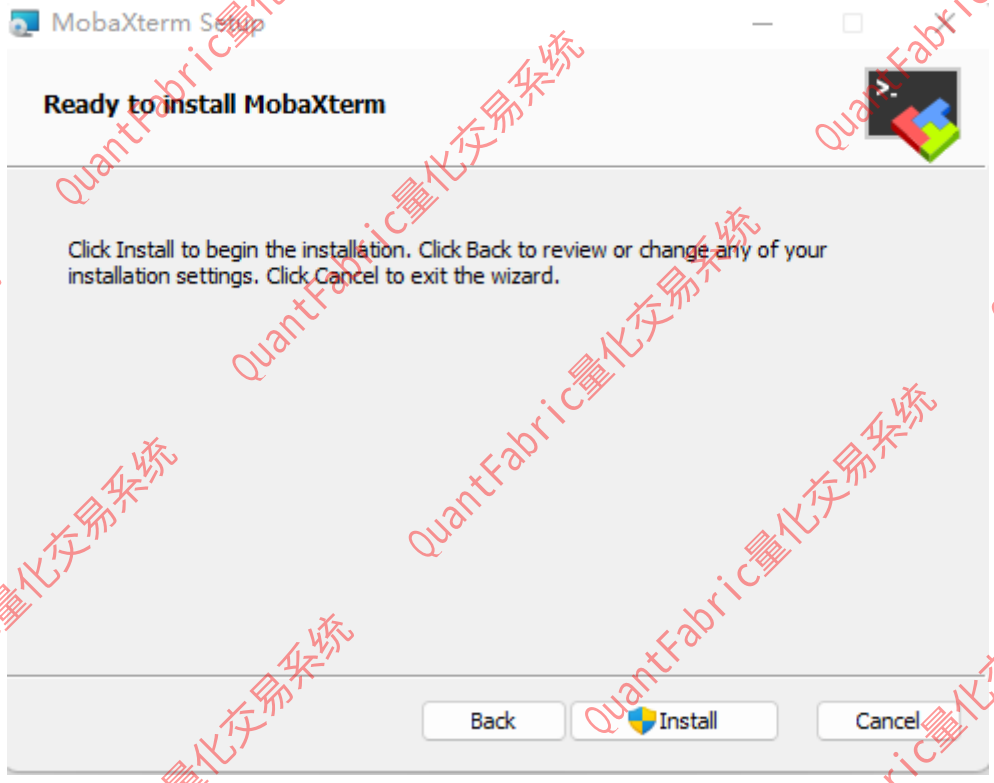
  - 确认许可：


MobaXterm Setup
End-User License Agreement
Please read the following license agreement carefully
MOBAXTERM END USER LICENSE AGREEMENT
Version dated June 15, 2021
By downloading, installing, using or copying MobaXterm Home Edition software package, you accept and agree to be bound by the terms of the Mobatek Home Edition end user license agreement (section 1.a).
By downloading, installing, using or copying MobaXterm Professional Edition software package, you accept and agree to be bound by the terms of
I accept the terms in the License Agreement
Print
Back
Next
Cancel

- 安装路径选择：

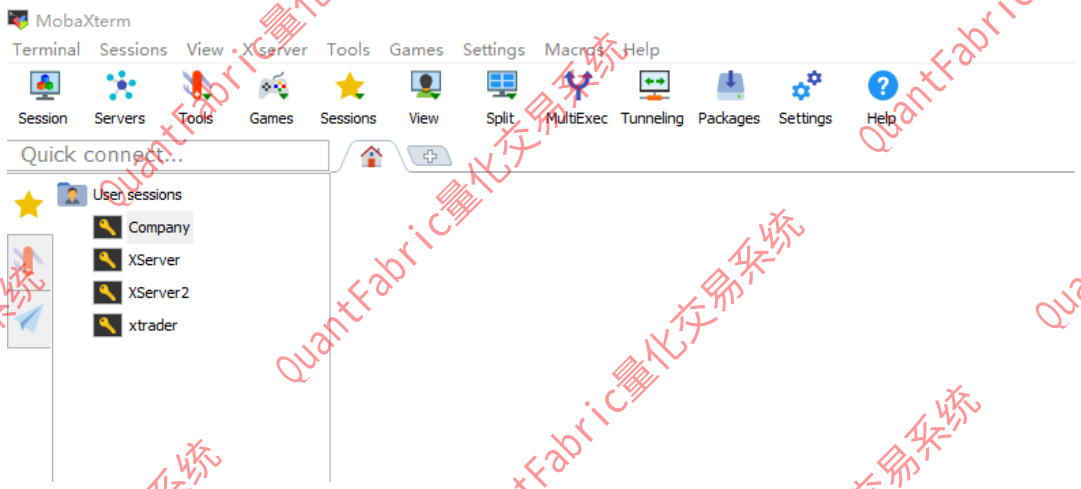

MobaXterm Setup
Destination Folder
Click Next to install to the default folder or click Change to choose another.
Install MobaXterm to:
C:\Program Files (x86)\Mobatek\MobaXterm\
Change...
Back
Next
Cancel

- 执行安装：

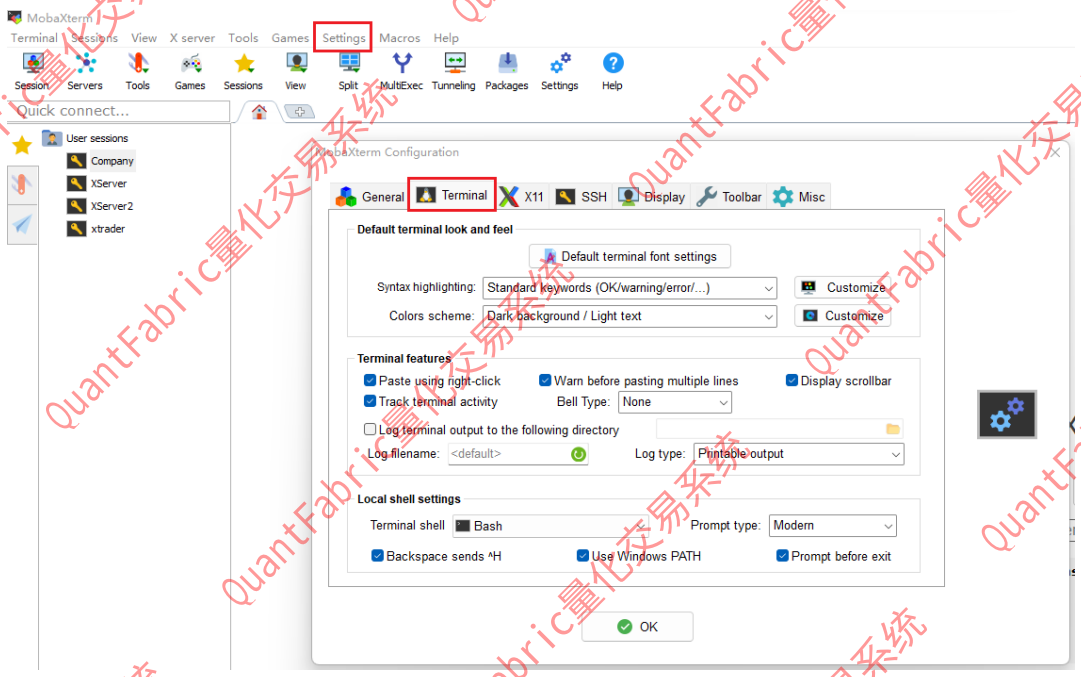


- 安装完成：

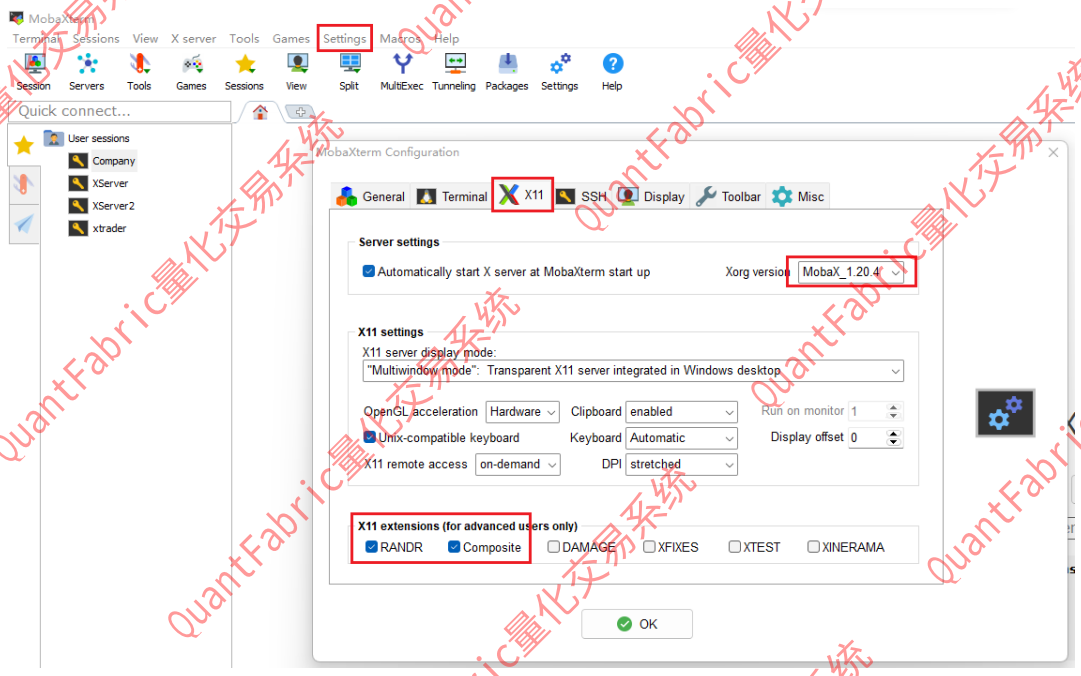
- 鼠标双击打开桌面MobaXterm程序：



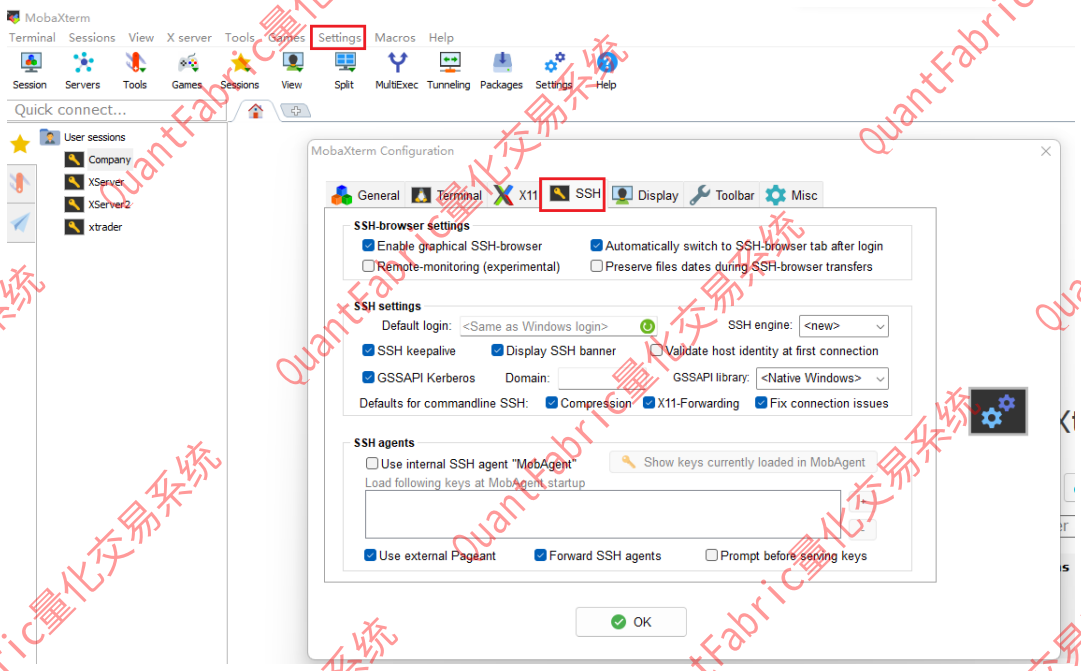
- MobaXterm Terminal设置：



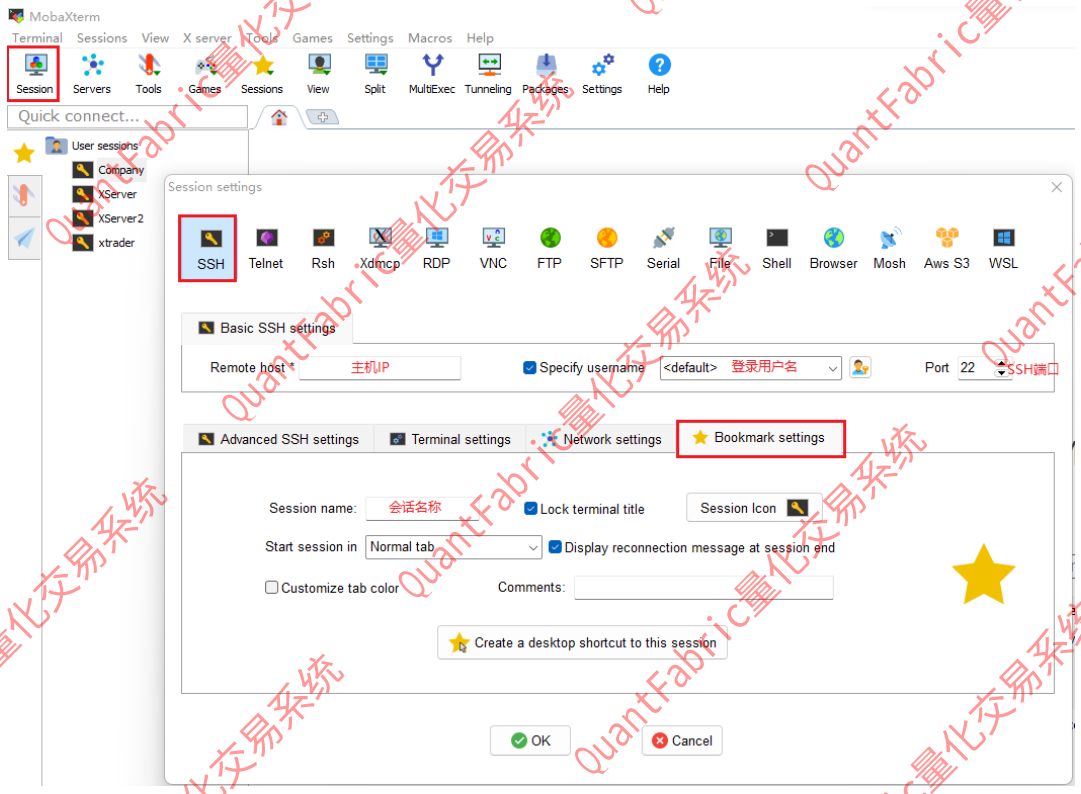
- MobaXterm X11设置：



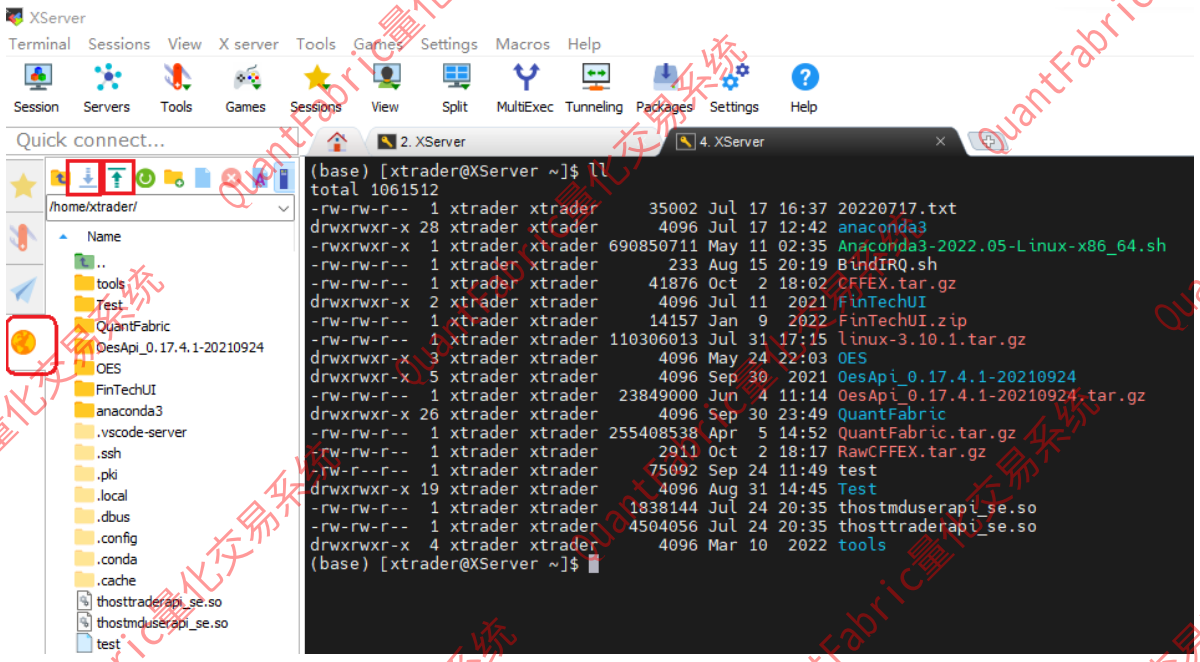
- MobaXterm SSH设置：



- 会话连接建立：



- MobaXterm SFTP功能：



3、sshd服务端口

- 远程主机sshd配置文件/etc/ssh/sshd_config：

```
Port 51622                    # 修改ssh端口
PasswordAuthentication yes    # 默认支持口令登录
```

- 重启sshd使改动生效：

```
/etc/init.d/sshd reload
```

4、创建用户

- 使用root用户登录Linux，创建xtrader用户：

```
useradd xtrader
```

- 设置xtrader用户密码：

```
passwd xtrader  # 输入两次密码
```

- 设置xtrader用户sudo权限，打开`/etc/sudoers`。

```
xtrader ALL=(ALL)       NOPASSWD:ALL
```

- 普通用户切换到root用户：

```
su - root
```

5、ssh免密登录

- ssh密钥生成：

```
ssh-keygen -t rsa -C "your_email@example.com"
```

- ssh-keygen用于生成秘钥：
  - -t： 指定密钥类型，默认是rsa，可选dsa、ecdsa、ed25519、rsa。
  - -C： 指定注释，比如邮箱。
  - -f： 指定密钥文件名。
- ssh-keygen会在 ~/.ssh下生成 id_rsa私钥文件,和id_rsa.pub公钥文件，私钥由客户端本地留存，公钥需保存到远程主机~/.ssh/authorized_keys文件内。
- 基于秘钥实现免密登录，通常需要先在客户端PC生成公钥，然后将公钥拷贝到远程主机，拷贝过程既可以手动（在远程主机用户目录下创建.ssh目录，然后将公钥存入.ssh/authorized_keys文件中即可），也可以直接使用ssh-copy-id命令操作。

```
ssh-copy-id [-i [identity_file]] [-p port] [user@]hostname
ssh-copy-id -i .ssh/id_rsa.pub  xtrader@Server
ssh-copy-id -p 30022 xtrader@Server
```

- **远程主机需要保证.ssh和 authorized_keys都只有用户自己有写权限，否则验证无效。**

```
chmod -R 700 ~/.ssh/
chmod 600 ~/.ssh/authorized_keys
```

- Windows客户端可以使用Git Bash的ssh-keygen和ssh-copy-id。
- SSH免密登录示例如下：

```
xtrader@DESKTOP-NG174BR MINGW64 ~
$ ssh-copy-id -p 51622 xtrader@47.108.252.223
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/c/Users/xtrader/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter
out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are
prompted now it is to install the new keys
xtrader@47.108.252.223's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh -p '51622'
'xtrader@47.108.252.223'"
and check to make sure that only the key(s) you wanted were added.


xtrader@DESKTOP-NG174BR MINGW64 ~
$ ssh -p '51622' 'xtrader@47.108.252.223'
Last login: Mon Oct  3 11:20:38 2022 from 171.221.139.134

Welcome to Alibaba Cloud Elastic Compute Service !

(base) [xtrader@XServer ~]$
```

三、防火墙

1、Linux网络防火墙

```
systemctl start firewalld           # 开启防火墙
systemctl stop firewalld            # 关闭防火墙
systemctl status firewalld          # 查看状态
systemctl disable firewalld         # 禁止开机启动
firewall-cmd --zone=public --list-ports # 查看所有打开的端口
firewall-cmd --zone=public --add-port=80/tcp --permanent # 开放TCP 80端口
firewall-cmd --zone=public --remove-port=80/tcp --permanent # 删除防火墙80端口配置
firewall-cmd --reload               # 更新防火墙规则
firewall-cmd --zone=public --query-port=80/tcp # 查询TCP 80端口
```

2、云服务器

- 针对云服务器安装部署Linux开发环境，Linux服务器自身有Linux网络防火墙，但云服务厂商本身仍然有一层网络防火墙，可以登录相应云服务(阿里云、天翼云等)查看、设置相应服务端口的开放情况。
- 如果不熟悉Linux系统环境，建议关闭Linux网络防火墙，保留云厂商防火墙。

四、GCC安装

- 安装EPEL

```
yum -y install epel-release
```

- 安装SCL源

```
yum install centos-release-scl scl-utils-build
```

- 安装devtoolset-9、rh-python36

```
yum install devtoolset-9
yum install rh-python36
```

- 开启SCL软件集，修改用户目录下`.bashrc`，追加。

```
source /opt/rh/devtoolset-9/enable
```

- 执行source，立即生效

```
source ~/.bashrc
```

- GCC版本查看：

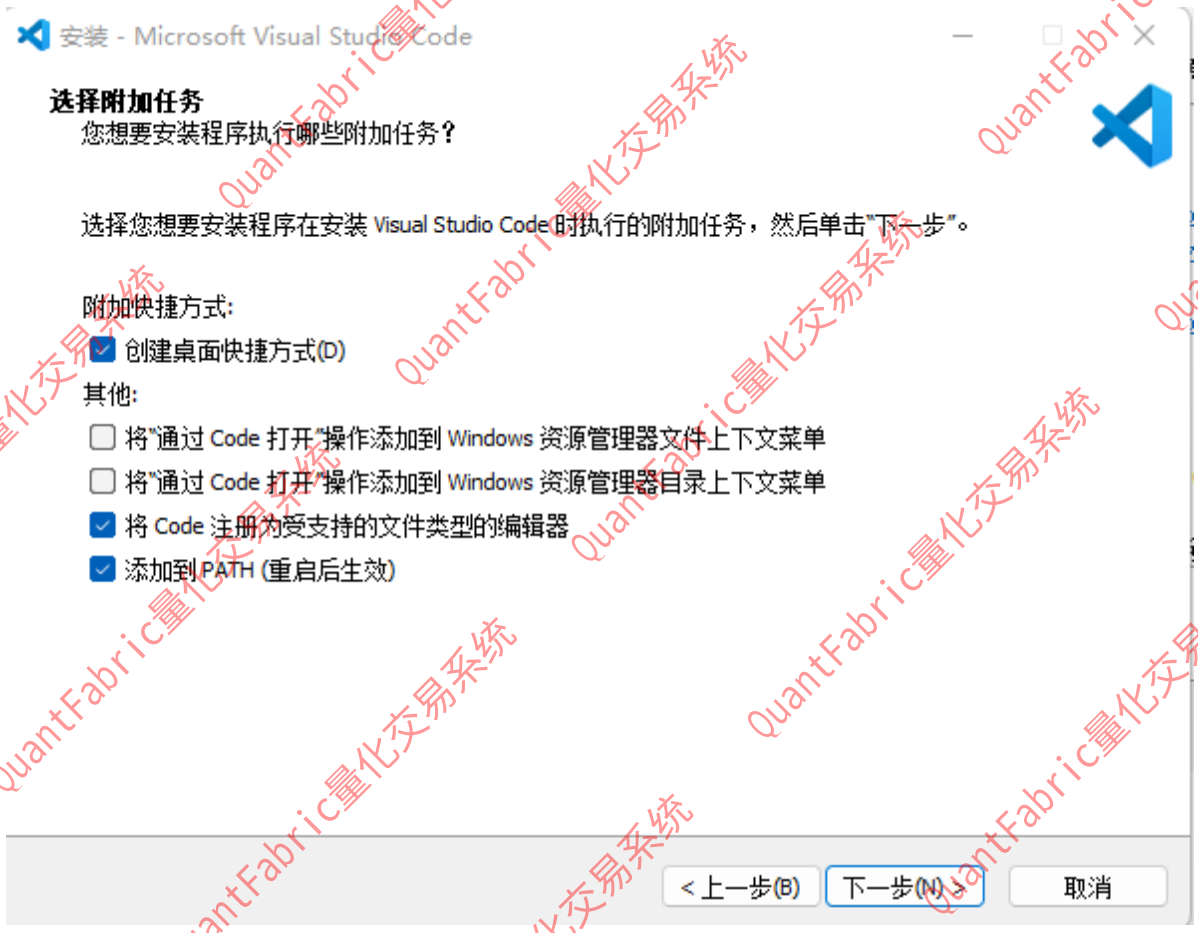
```
[xtrader@XServer ~]$ gcc -v
Using built-in specs.
COLLECT_GCC=gcc
COLLECT_LTO_WRAPPER=/opt/rh/devtoolset-9/root/usr/libexec/gcc/x86_64-redhat-
linux/9/lto-wrapper
Target: x86_64-redhat-linux
Configured with: ../configure --enable-bootstrap --enable-
languages=c,c++,fortran,lto --prefix=/opt/rh/devtoolset-9/root/usr --
mandir=/opt/rh/devtoolset-9/root/usr/share/man --infodir=/opt/rh/devtoolset-
9/root/usr/share/info --with-bugurl=http://bugzilla.redhat.com/bugzilla --
enable-shared --enable-threads=posix --enable-checking=release --enable-multilib
--with-system-zlib --enable-__cxa_atexit --disable-libunwind-exceptions --
enable-gnu-unique-object --enable-linker-build-id --with-gcc-major-version-only
--with-linker-hash-style=gnu --with-default-libstdcxx-abi=gcc4-compatible --
enable-plugin --enable-initfini-array --with-isl=/builddir/build/BUILD/gcc-
9.3.1-20200408/obj-x86_64-redhat-linux/isl-install --disable-libmpx --enable-
gnu-indirect-function --with-tune=generic --with-arch_32=x86-64 --build=x86_64-
redhat-linux
Thread model: posix
gcc version 9.3.1 20200408 (Red Hat 9.3.1-2) (GCC)
```

五、VSCode

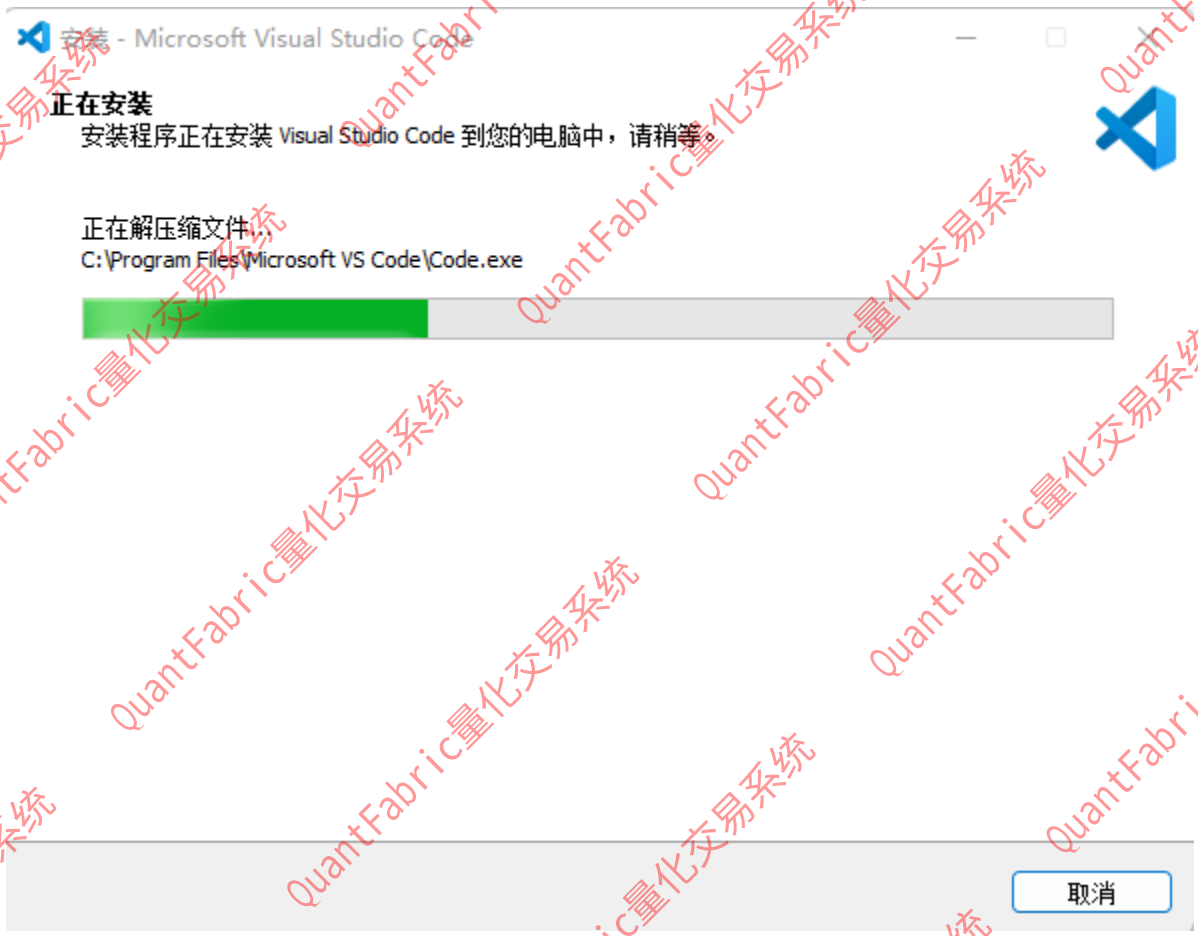
1、VSCode安装

- 下载：VSCode
- 点击鼠标右键选择管理员身份安装VSCodeSetup：

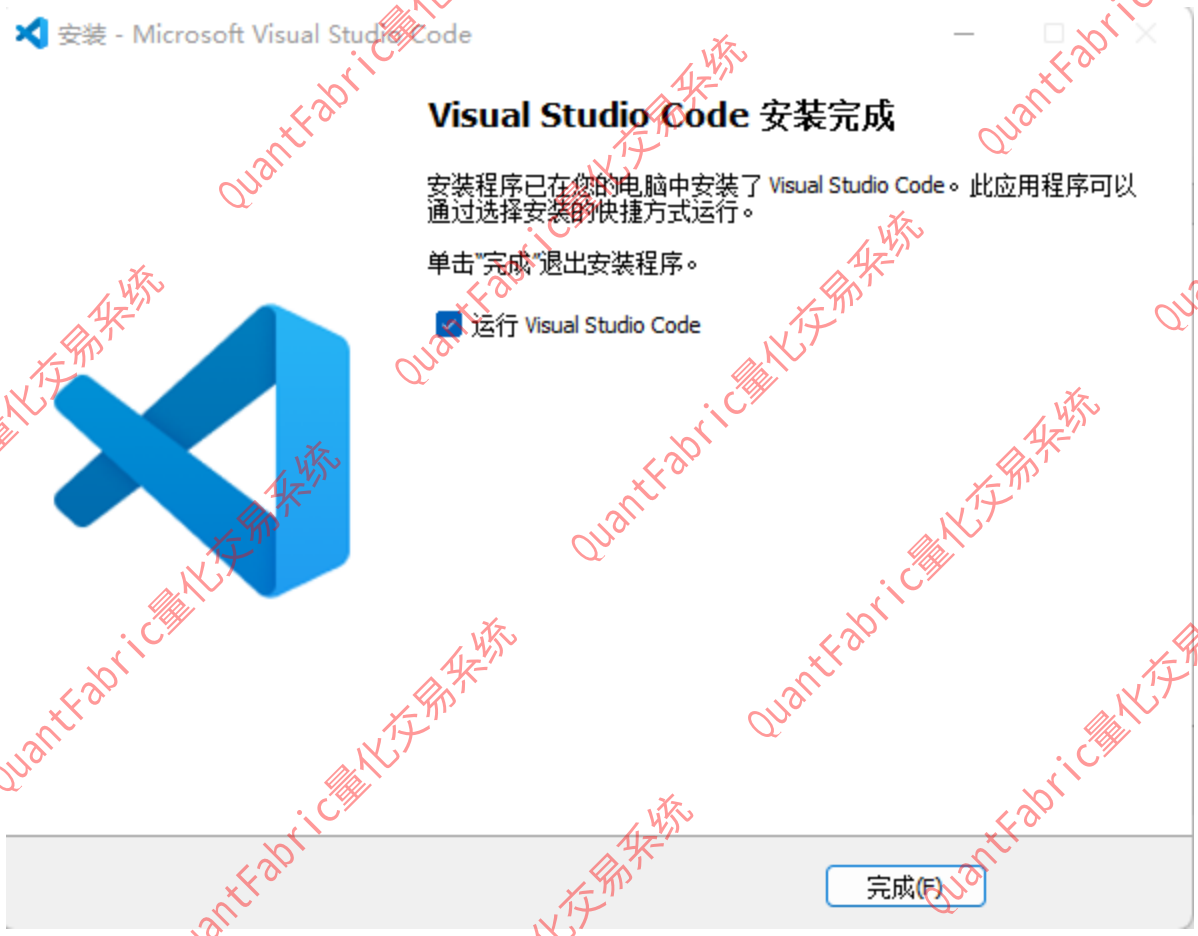
- 选择配置：


安装 - Microsoft Visual Studio Code
选择附加任务
您想要安装程序执行哪些附加任务？
选择您想要安装程序在安装 Visual Studio Code 时执行的附加任务，然后单击"下一步"。
附加快捷方式:
创建桌面快捷方式(D)
其他:
将"通过 Code 打开"操作添加到 Windows 资源管理器文件上下文菜单
将"通过 Code 打开"操作添加到 Windows 资源管理器目录上下文菜单
将 Code 注册为受支持的文件类型的编辑器
添加到 PATH (重启后生效)
< 上一步(B)
下一步(N) >
取消

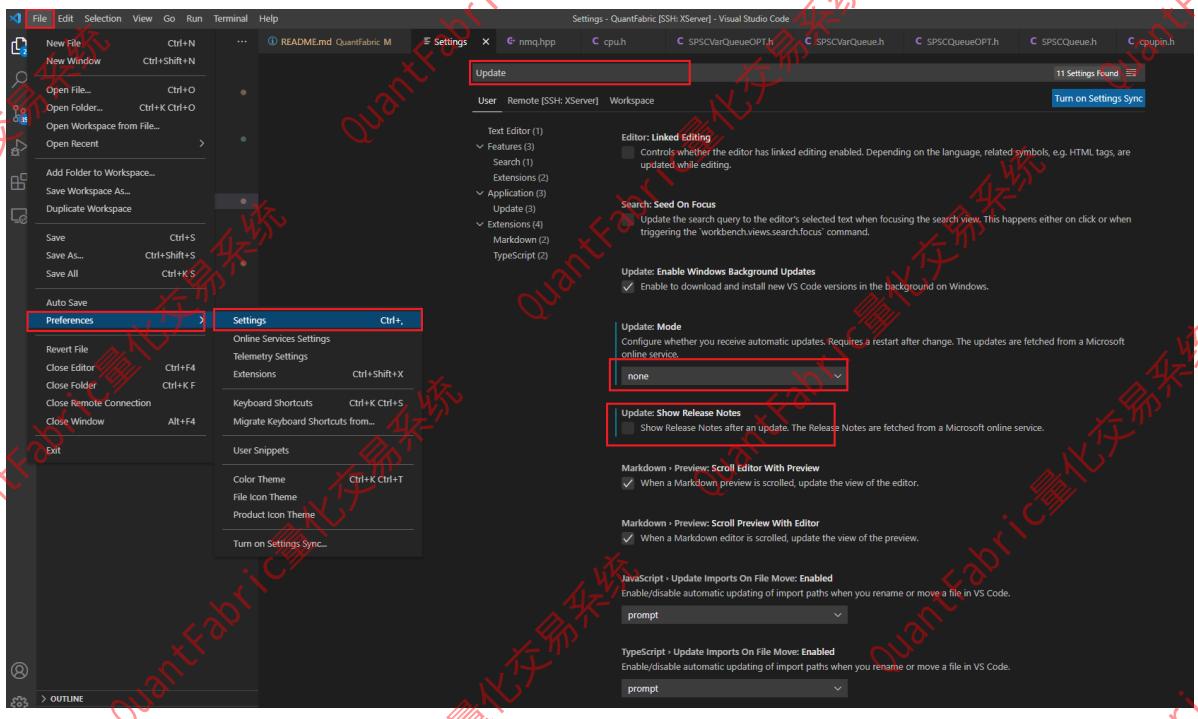
- 执行安装:


安装 - Microsoft Visual Studio Code
正在安装
安装程序正在安装 Visual Studio Code 到您的电脑中，请稍等。
正在解压缩文件:
C:\Program Files\Microsoft VS Code\Code.exe
取消

- 安装完成:



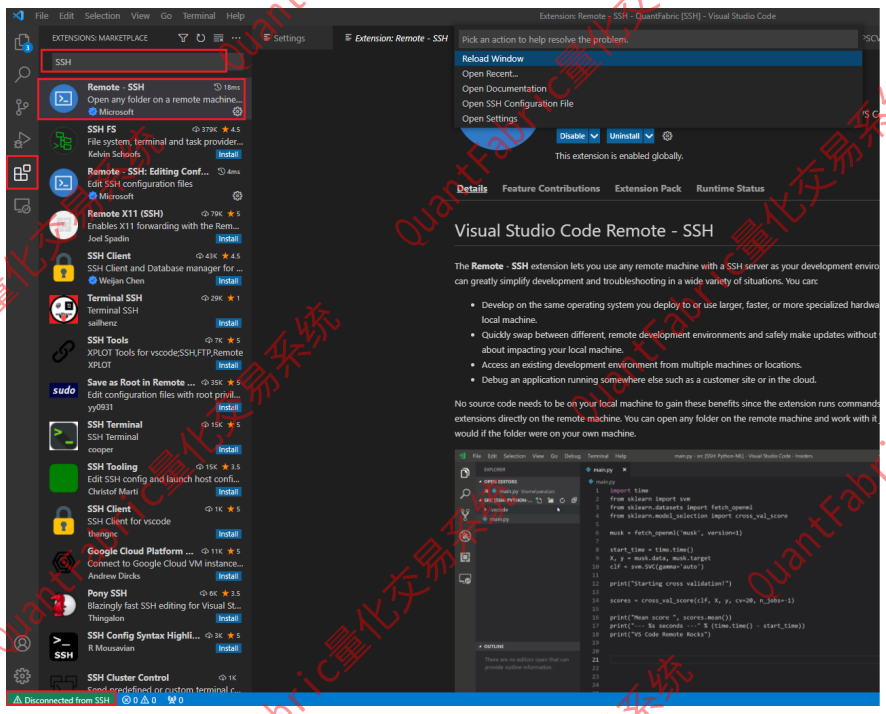
- 关闭自动更新服务：



- 注意：不要升级VSCode客户端，由于升级VSCode版本可能会导致VSCode客户端与运行在Linux服务器器的vscode-server服务端不兼容，并且由于下载升级vscode-server需要通过国际网络，因此可能很容易导致VSCode客户端升级后连接vscode-server服务端一直处于失败状态。

2、Remote-SSH插件安装

- VSCode应用商店搜索SSH，选中Reomte-SSH插件安装。



3、远程开发

- 连接远程Linux服务器：

- VSCode远程连接完成后，安装在用户目录下.vscode-server目录。

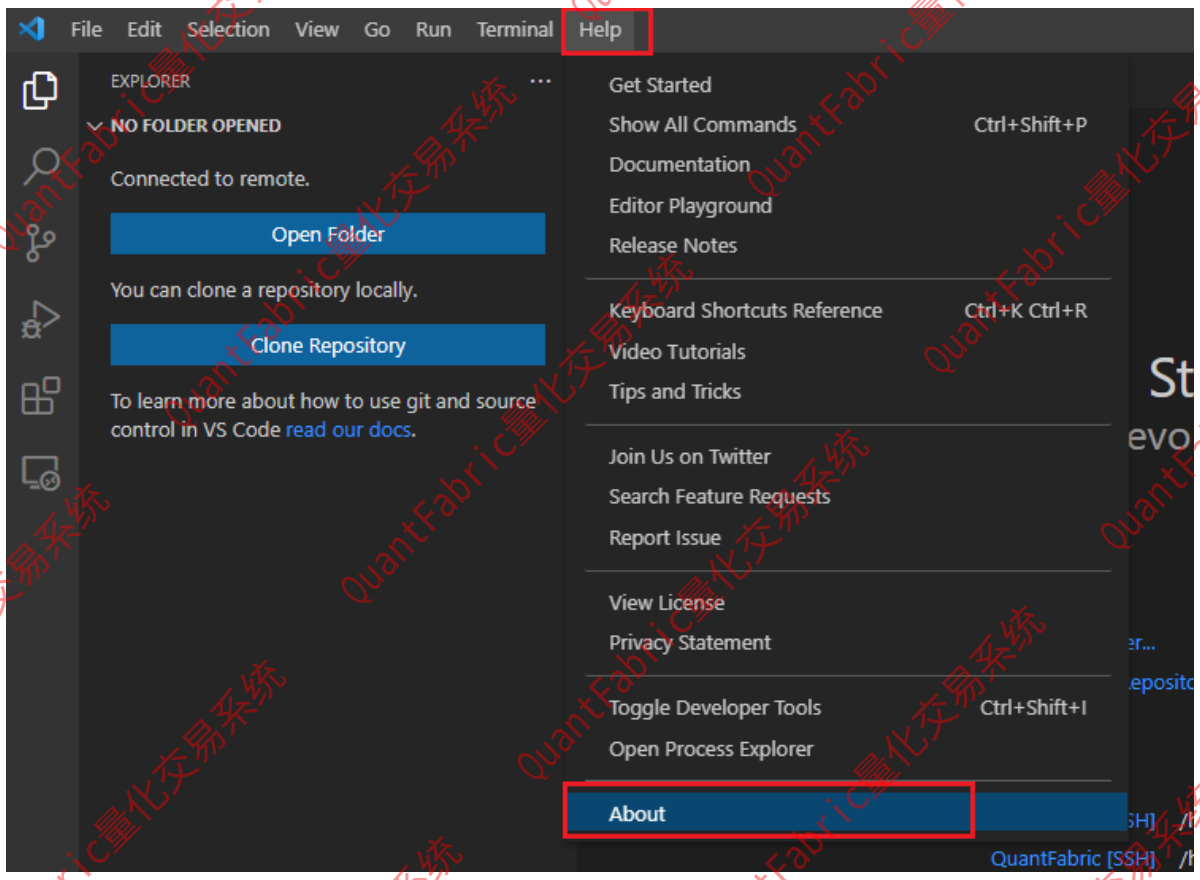
```
[xtrader@XServer .vscode-server]$ tree -L 3
.
├── bin
│   └── b3318bc0524af3d74034b8bb8a64df0ccf35549a
│       ├── bin
│       ├── extensions
│       ├── LICENSE
│       ├── node
│       ├── node_modules
│       ├── out
│       ├── package.json
│       ├── product.json
│       ├── server.sh
│       └── vscode-remote-lock.xtrader.b3318bc0524af3d74034b8bb8a64df0ccf35549a
├── data
```

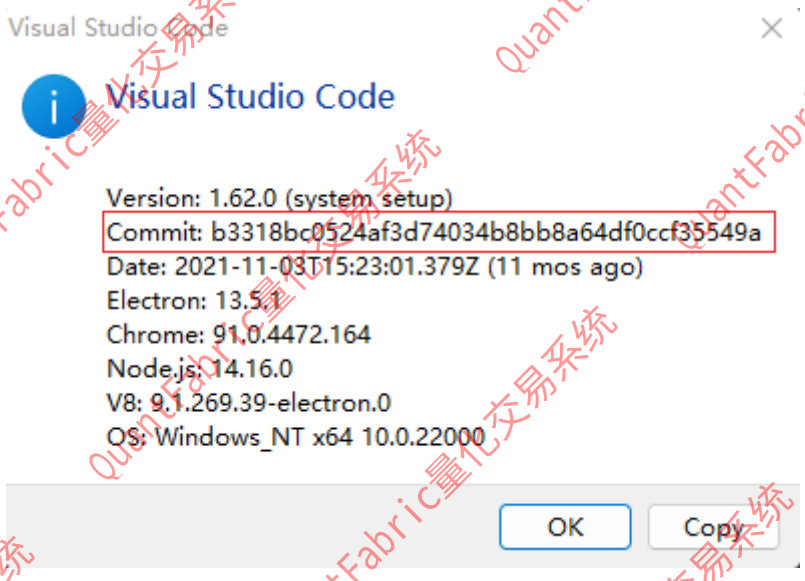
```
|   ├── logs
|   |   └── 20221003T122057
|   ├── Machine
|   ├── machineid
|   └── User
|       └── globalStorage
└── extensions
```

- bin目录下面存放VS Code Server程序，extensions目录存放VS Code Server端安装的插件，data目录下是用户数据。

4、vscode-server离线安装

- VSCode版本确认：





- 下载相应版本的vscode-server，可以在Windows端下载后上传也可以直接在Linux服务器下载

```
[xtrader@xServer ~]commit_id=c47d83b293181d9be64f27ff093689e8e7aed054
[xtrader@xServer ~]curl -sSL
"https://update.code.visualstudio.com/commit:${commit_id}/server-linux-
x64/stable" -o vscode-server-linux-x64.tar.gz
```

- 安装vscode-server：

```
[xtrader@xServer ~]mkdir -p ~/.vscode-server/bin/${commit_id}
[xtrader@xServer ~]tar zxvf vscode-server-linux-x64.tar.gz -C ~/.vscode-
server/bin/${commit_id} --strip 1
[xtrader@xServer ~]touch ~/.vscode-server/bin/${commit_id}/0
```

六、Qt

1、Qt安装

- Qt版本：Qt 5.12.12
- 下载Qt 5.12.12：

Name	Last modified	Size	Metadata
Parent Directory		-	
submodules/	25-Nov-2021 08:09		
single/	25-Nov-2021 08:08	-	
qt-opensource-windows-x86-5.12.12.exe	25-Nov-2021 08:12	3.7G	Details
qt-opensource-mac-x64-5.12.12.dmg	25-Nov-2021 08:11	2.7G	Details
qt-opensource-linux-x64-5.12.12.run	25-Nov-2021 08:10	1.3G	Details
md5sums.txt	25-Nov-2021 08:18	210	Details

For Qt Downloads, please visit qt.io/download

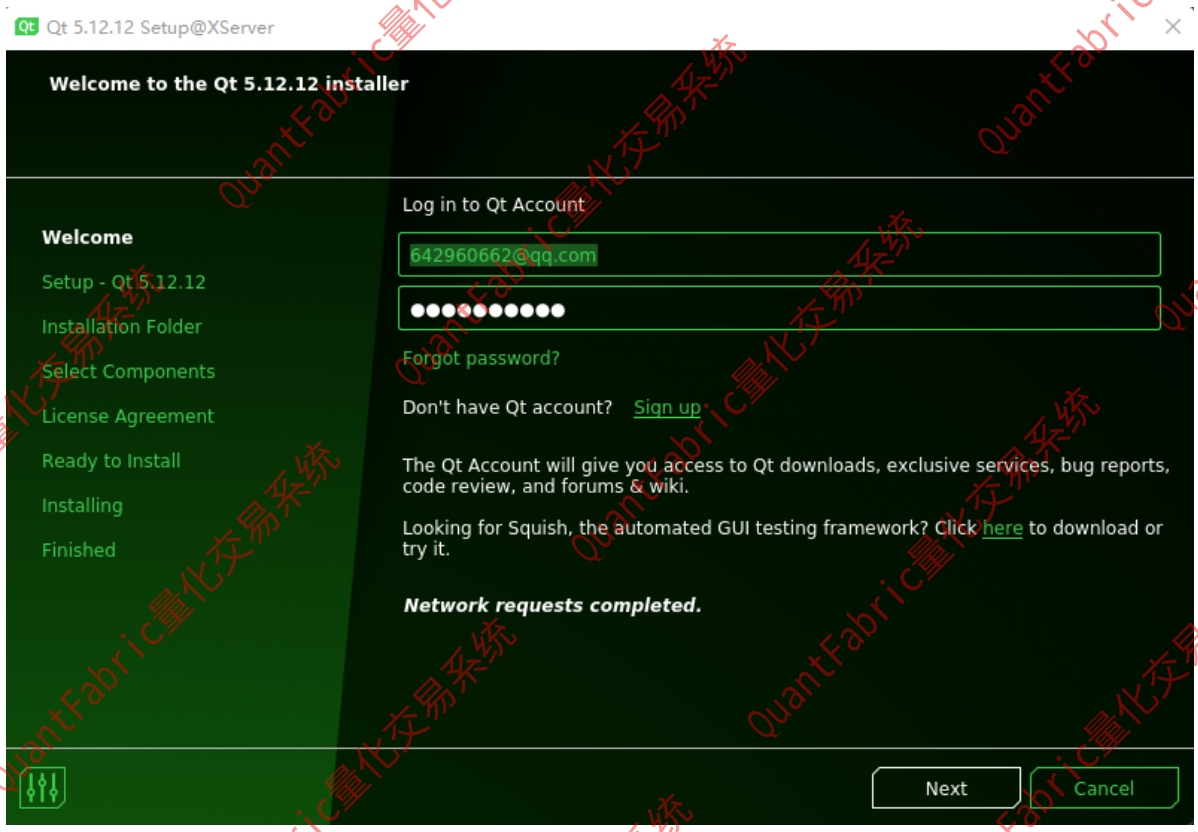
The Qt Company Ltd, Bertel Jungin aukio D3A, 02600 Espoo, Finland. Org. Nr. 2637805-2

List of official Qt-project mirrors

- 通过MobaXterm SFTP工具将安装包上传至Linux服务器，执行安装操作：

```
sudo ./qt-opensource-linux-x64-5.12.12.run
```

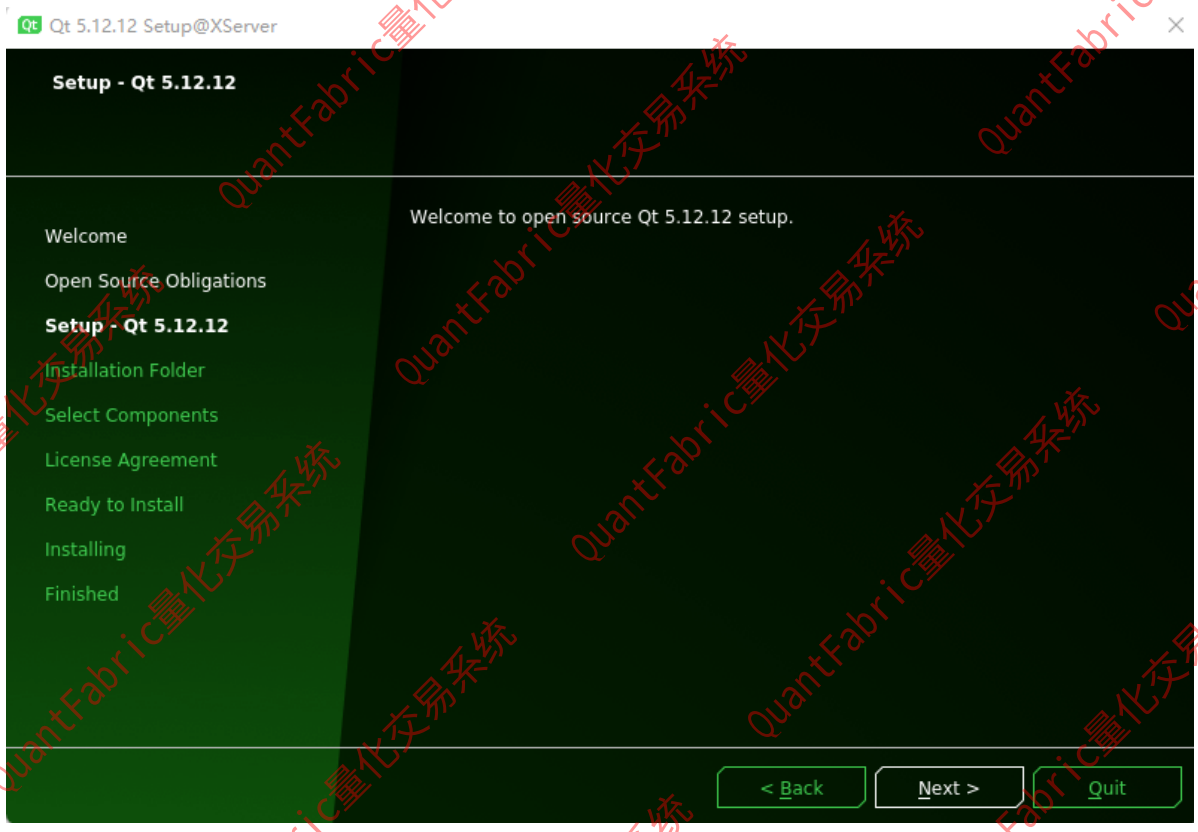
- 登录Qt账户认证，需要到Qt官网注册账户：Qt Account


Qt 5.12.12 Setup@XServer
Welcome to the Qt 5.12.12 installer
Welcome
Setup - Qt 5.12.12
Installation Folder
Select Components
License Agreement
Ready to Install
Installing
Finished
Log in to Qt Account
6429606620qq.com
Forgot password?
Don't have Qt account? Sign up
The Qt Account will give you access to Qt downloads, exclusive services, bug reports, code review, and forums & wiki.
Looking for Squish, the automated GUI testing framework? Click here to download or try it.
Network requests completed.
Next
Cancel

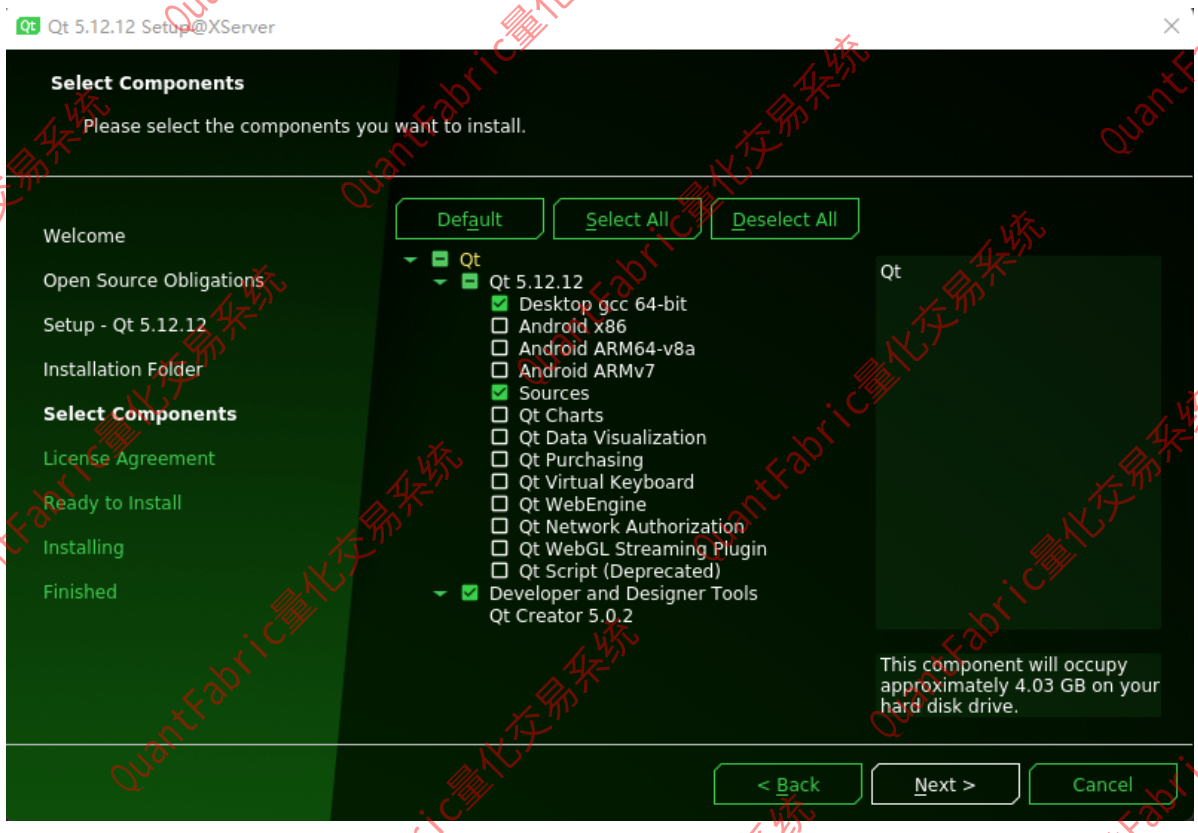
- 许可协议确认：


Qt 5.12.12 Setup@XServer
Qt Open Source Usage Obligations
Welcome
Open Source Obligations
Setup - Qt 5.12.12
Installation Folder
Select Components
License Agreement
Ready to Install
Installing
Finished
Qt Open Source version is available under GNU General Public License v3 and Lesser GNU General Public License v3. A few components are available under GNU General Public License v2.
Read and accept the Open Source Usage Obligations below. Reading the link below
Choosing the right license for your projects
Buy Qt
(Lesser) GNU General Public License v3 obligations
• You must not combine code developed with a commercial Qt license with code developed with an open source license of Qt in one project or product
• Provide a license copy & explicitly acknowledge Qt use
• Make a Qt source code copy available for customers
• Accept that Qt source code modifications are non-proprietary
• Make consumer devices, which allow users to access to install and run modified versions of the SW inside them
• Accept Digital Rights Management terms, see the GPL FAQ
• Take special consideration when attempting to enforce software patents FAQ
• For further information, refer to GPLv3 and LGPLv3
I have read and agree to the terms and conditions of using Open Source Qt
Enter your company/business name
I'm an individual and do not use Qt for any company
< Back
Next >
Cancel

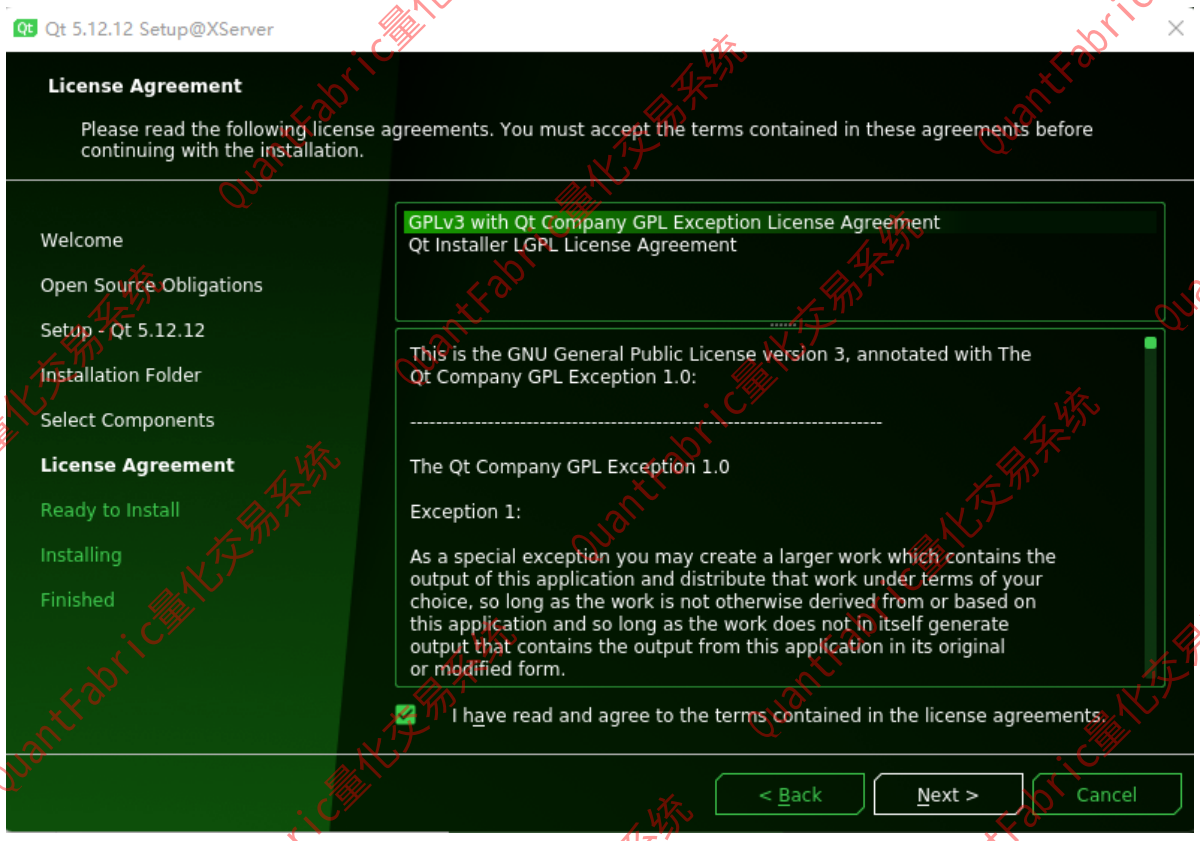
- 准备安装：



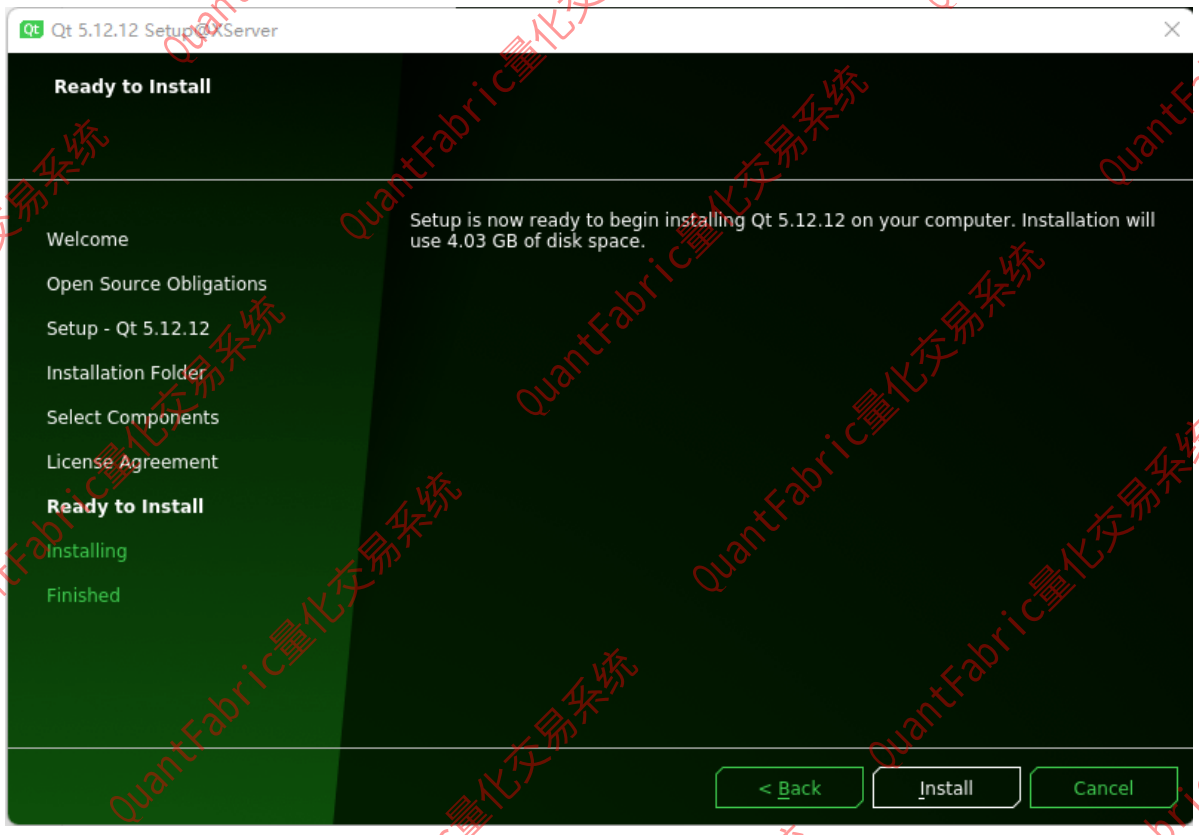
- 选择安装路径
- 安装组件选择：



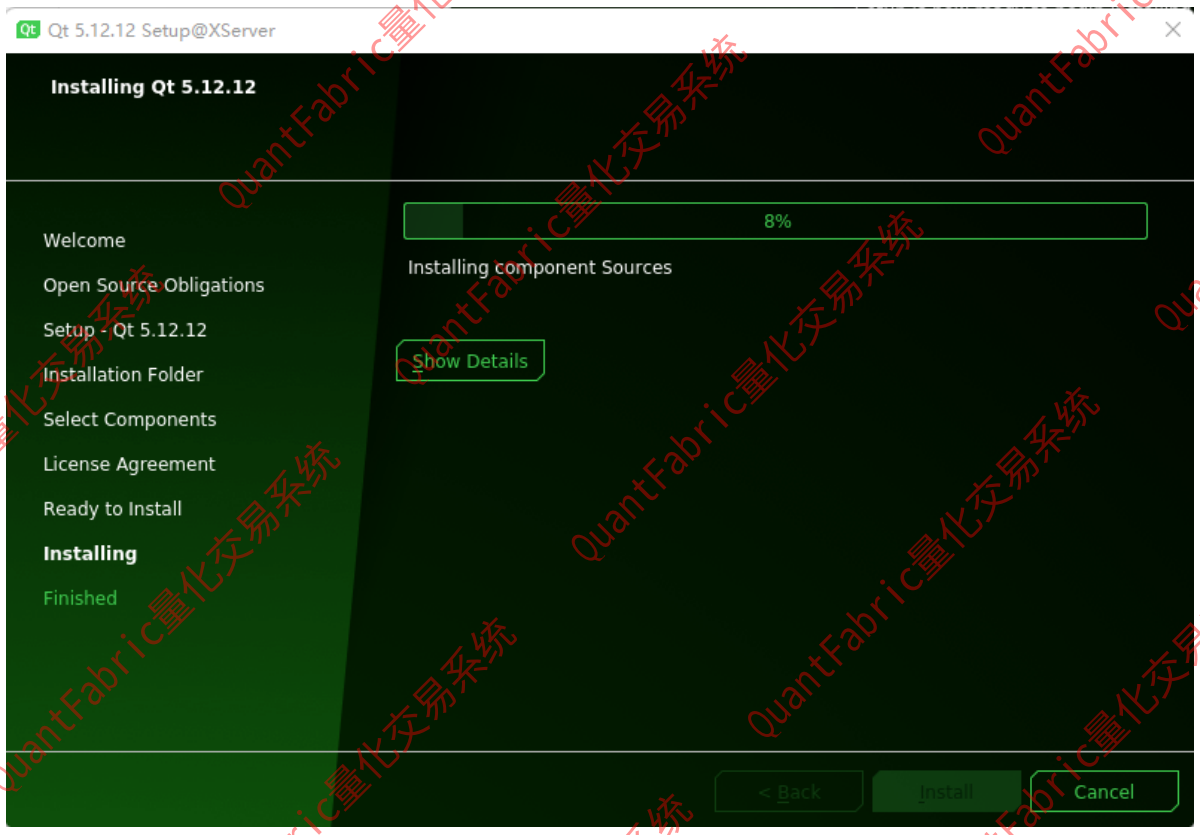
- 许可协议确认：


Qt 5.12.12 Setup@XServer
License Agreement
Please read the following license agreements. You must accept the terms contained in these agreements before continuing with the installation.
Welcome
Open Source Obligations
Setup - Qt 5.12.12
Installation Folder
Select Components
License Agreement
Ready to Install
Installing
Finished
GPLv3 with Qt Company GPL Exception License Agreement
Qt Installer LGPL License Agreement
This is the GNU General Public License version 3, annotated with The Qt Company GPL Exception 1.0:
The Qt Company GPL Exception 1.0
Exception 1:
As a special exception you may create a larger work which contains the output of this application and distribute that work under terms of your choice, so long as the work is not otherwise derived from or based on this application and so long as the work does not in itself generate output that contains the output from this application in its original or modified form.
I have read and agree to the terms contained in the license agreements.
< Back
Next >
Cancel

- 执行安装：


Qt 5.12.12 Setup@XServer
Ready to Install
Welcome
Open Source Obligations
Setup - Qt 5.12.12
Installation Folder
Select Components
License Agreement
Ready to Install
Installing
Finished
Setup is now ready to begin installing Qt 5.12.12 on your computer. Installation will use 4.03 GB of disk space.
< Back
Install
Cancel

- 安装过程：



- 安装完成：

- 修改用户的`.bash_profile`增加QT环境变量设置：

```
export QTDIR=/home/xtrader/Qt5.12.12/
export PATH=$QTDIR/5.12.12/gcc_64/bin:$QTDIR/Tools/QtCreator/bin/:$PATH
```

- 执行生效：

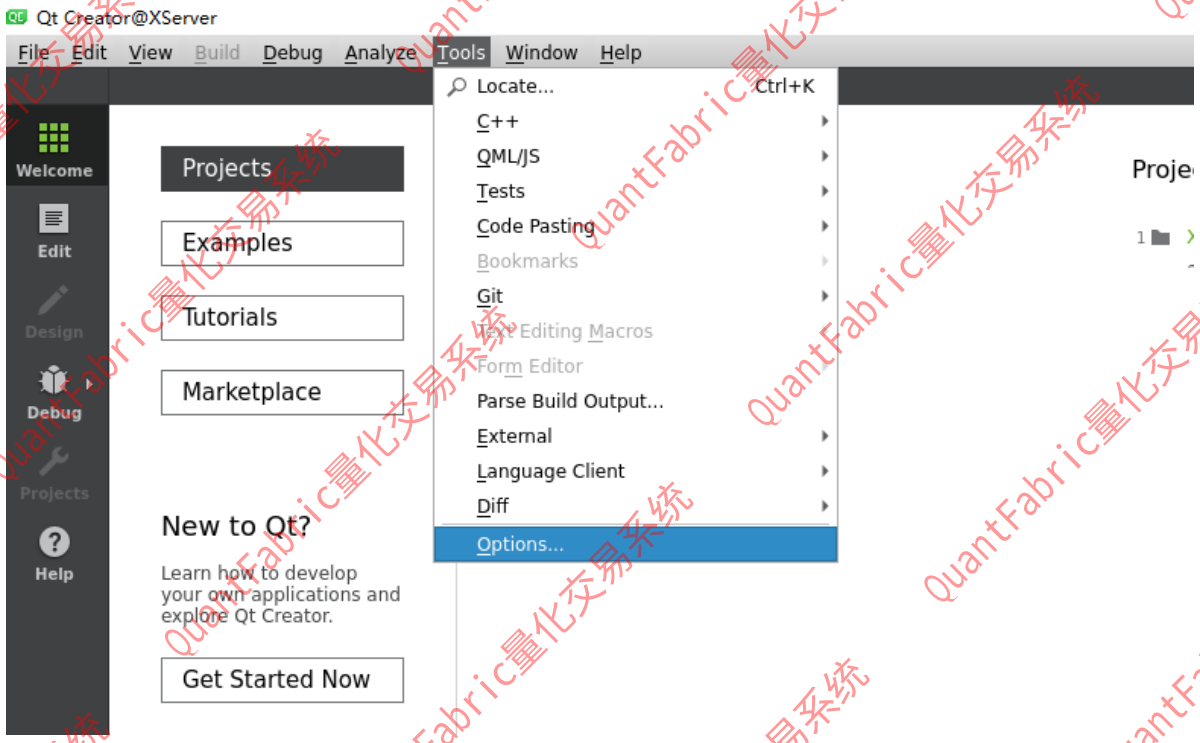
```
source .bash_profile
```

- 启动qtcreator

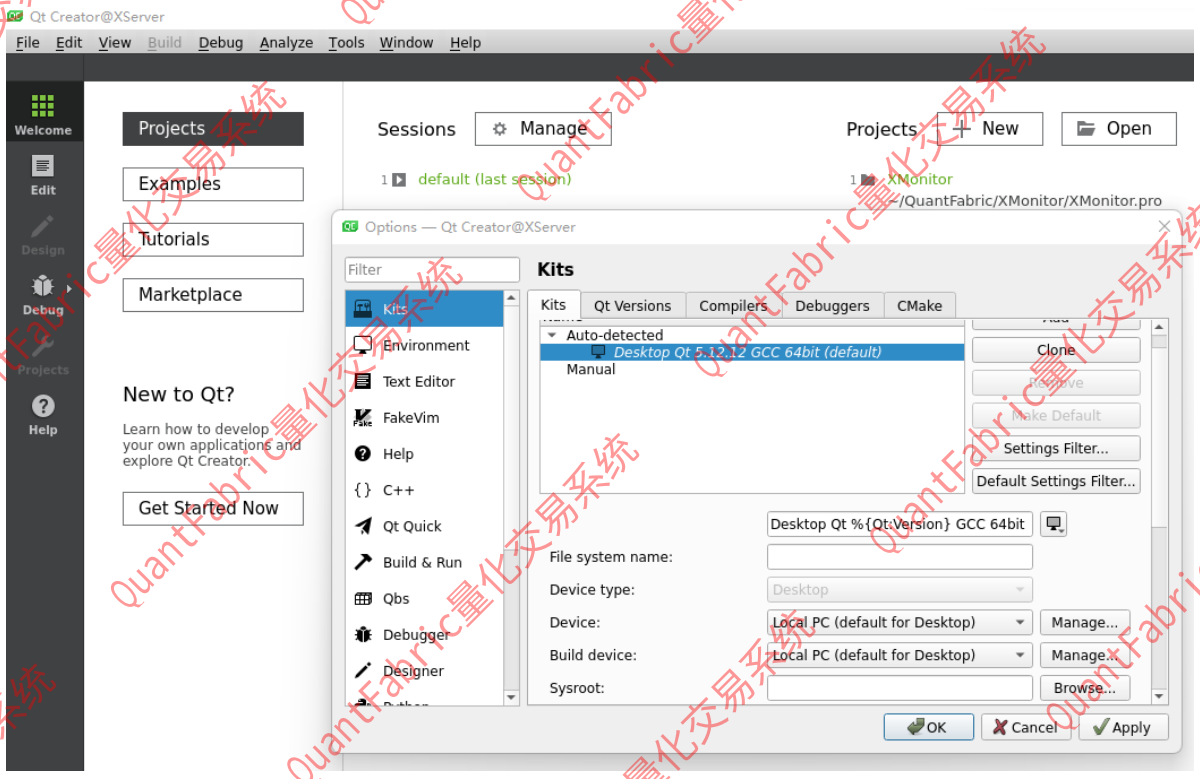
```
[xtrader@xServer ~]$ qtcreator
```

2、Qt开发套件配置

- 启动qtcreator



- Qt Kit配置：



- 如果Linux开发服务器在开发者内网，可以使用qtcreator进行开发调试；如果Linux开发服务器不在开发者内网，建议使用VSCode进行编码开发。
- XMonitor编译构建参看后续内容。

七、CMake

- 下载CMake: CMake 3.24.2
- 下载cmake-3.24.2-linux-x86_64.sh并上传到Linux服务器:
- 将cmake-3.24.2-linux-x86_64.sh拷贝到 `/usr/local/` 目录下。
- 执行安装:

```
sudo sh cmake-3.24.2-linux-x86_64.sh
```

- 更新覆盖cmake:

```
sudo rm /usr/bin/cmake
sudo ln -s /usr/local/cmake-3.24.2-linux-x86_64/bin/cmake /usr/bin/cmake
```

八、QuantFabric编译构建

1、Git子模块

- Git子模块用于解决不同开发团队之间团队协作的问题，允许将一个Git仓库作为另一个Git仓库的子目录，可以将另一个仓库克隆到自己项目中，同时还保持提交的独立。

```
git submodule     # 查看当前项目的子模块
git submodule init  # 初始化子模块
git submodule update    # 更新项目内子模块到最新版本
git submodule update --remote # 更新子模块为远程项目的最新版本
git submodule foreach 'git pull origin master' # 多个子模块遍历更新代码
git submodule add <url> <path>  # 增加子模块
git submodule add -b <branch> <url> <path>  # 增加子模块并切换到branch分支
```

- 子模块信息保存在主项目的 `.gitmodules` 文件。
- 子模块删除:
  - 删除子模块目录

    ```
    git rm --cached XXXXX
    rm -rf XXXXX
    ```

  - 删除 `.gitmodules` 文件中子模块信息:

    ```
    [submodule "XXXXX"]
            path = XXXXX
            url = https://github.com/xxxx/XXXXX.git
    ```

  - 删除 `.git/config` 中子模块信息:

    ```
    [submodule "XXXXX"]
            url = https://github.com/xxxx/XXXXX.git
            active = true
    ```

  - 删除 `.git` 目录的子模块:

```
rm -rf .git/modules/XXXXX
```

2、QuantFabric编译构建

- 项目地址：QuantFabric
- QuantFabric量化交易系统下载：

```
git clone --recursive git@gitcode.net:quantfabric/QuantFabric.git
```

- QuantFabric编译构建：

```
cd QuantFabric          # 进入QuantFabric目录
git submodule init      # 初始化子模块
git submodule update --remote   # 更新子模块
sh build_release.sh     # 编译构建
```

- 编译构建完成时，可执行文件和so文件位于build目录下。
- 单个子模块更新代码：

```
cd XMonitor
git pull origin master
```

- 多个子模块遍历更新代码：

```
git submodule foreach 'git pull origin master'
git submodule update --remote # 更新子模块为远程项目的最新版本
```

3、XMonitor编译构建

- XMonitor编译构建流程：

```
cd XMonitor             # 进入XMonitor目录
git pull
git submodule init      # 初始化子模块
git submodule update --remote   # 更新子模块
mkdir build
cd build
qmake ..
make
```

- 编译构建完成时，可执行文件位于build目录下。
- 由于CMake对于Qt工程构建不完美，本人仍然使用qmake对XMonitor进行单独编译构建。如果需要使用CMake构建XMonitor，请参看CMake构建Qt工程实践。