

Experiment Overview



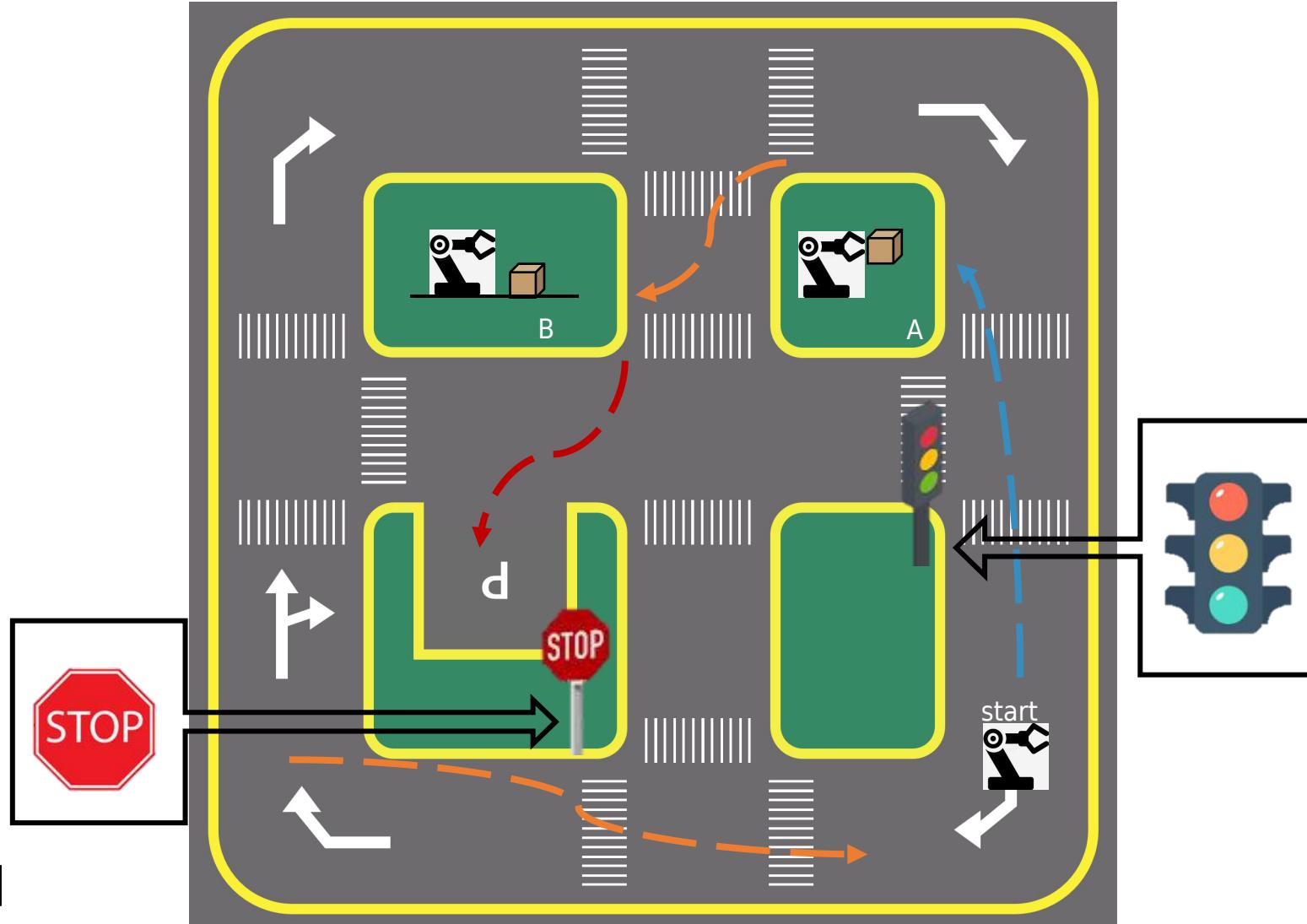
Content

- 1 Goal**
- 2 Platform**
- 3 Basic Knowledge**
- 4 Tools**



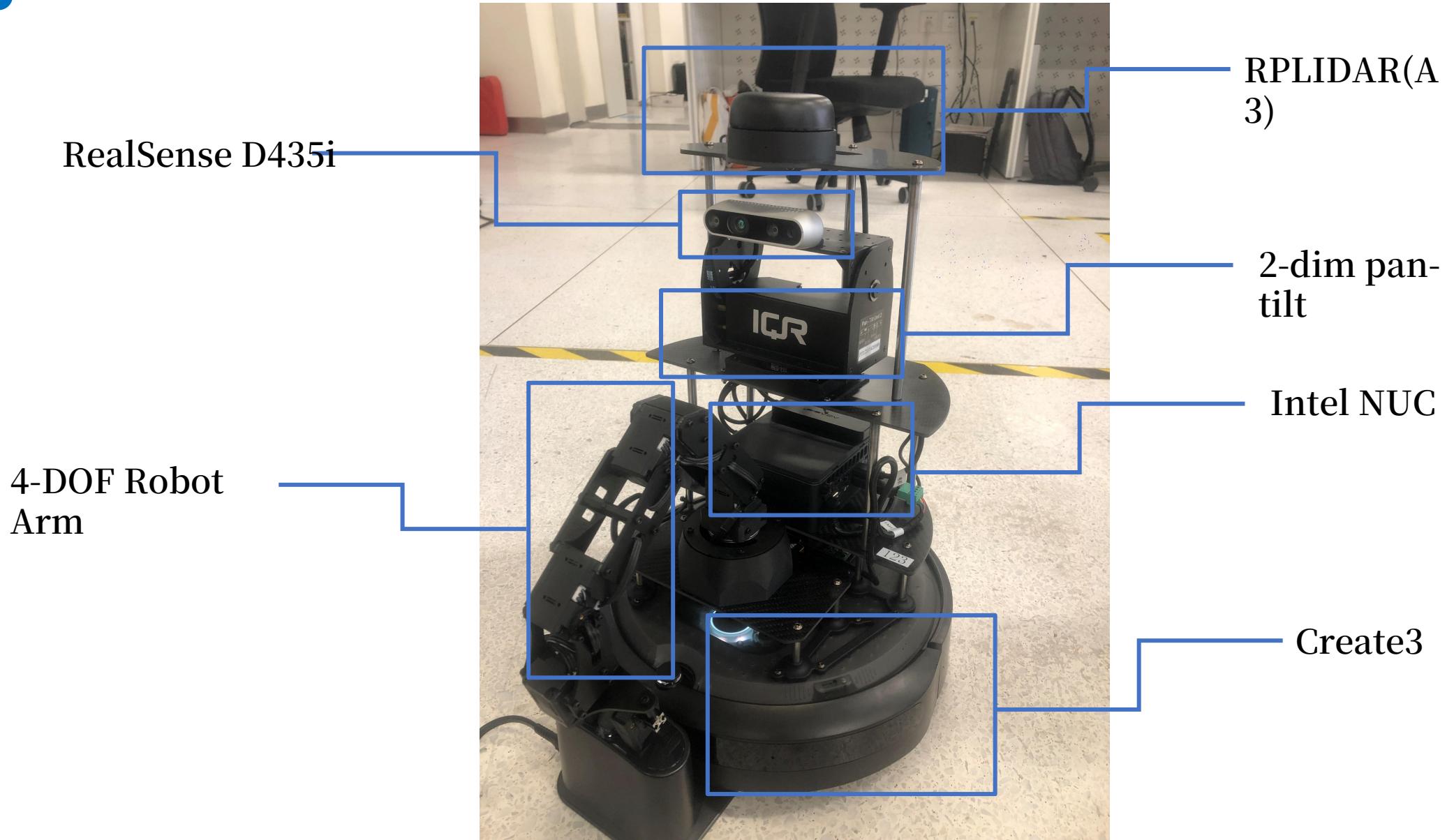
1**Goal**

- Go to Area A
- Detect traffic lights using a camera
- Use the camera to Detect the box lying on the ground
- Use the manipulator to get the box
- Go to Area B
- Put down the box
- Identify the parking lot marker and Go to the parking lot
- Stop moving when a stop sign is detected on the road
- Return to start

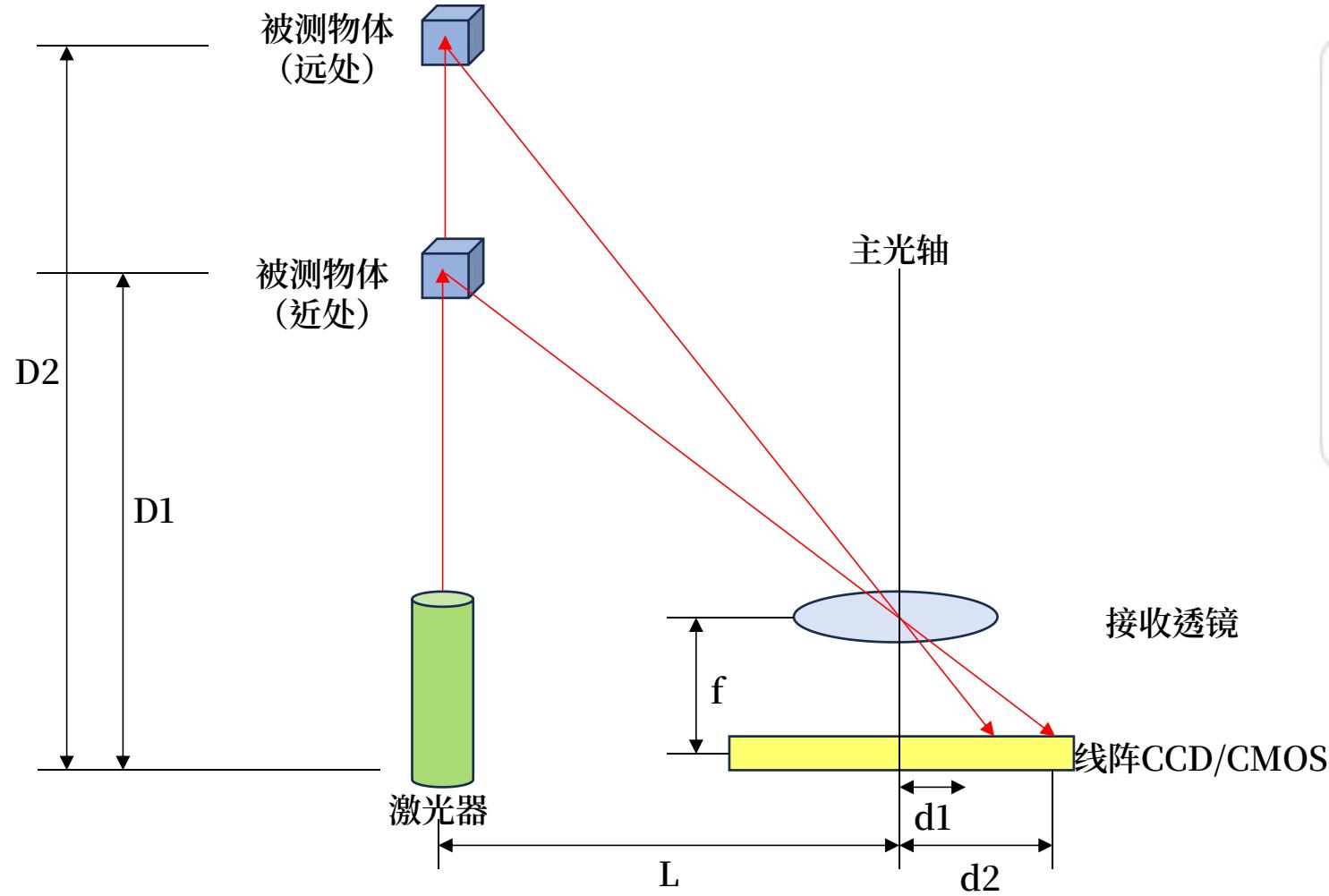


2

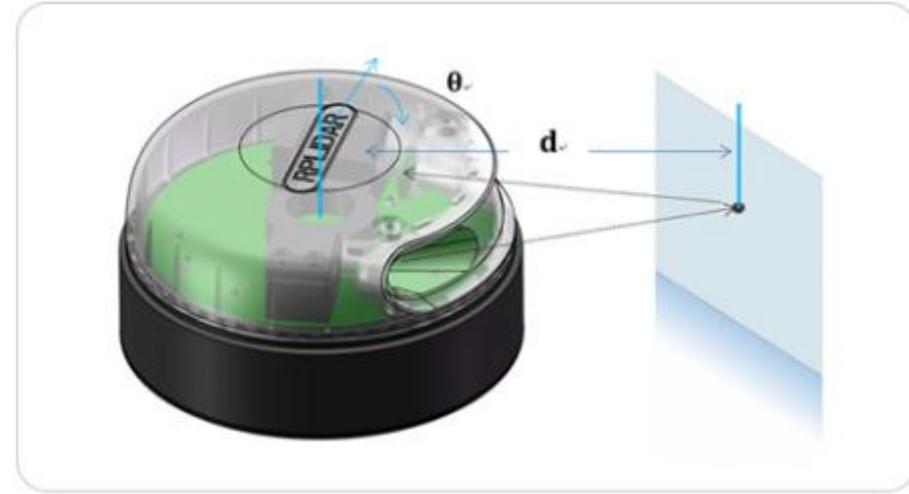
Platform



Platform



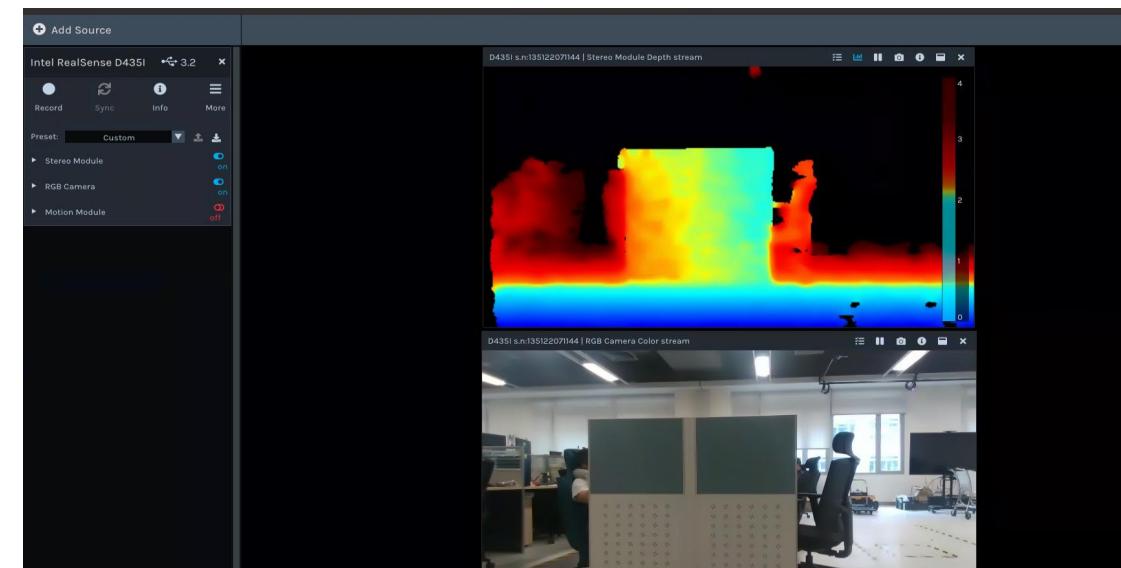
$$D = f(L+d)/d$$



Sample Rate: 16 kHz
Spin Rate: 10 Hz
Angular Resolution:
0.225

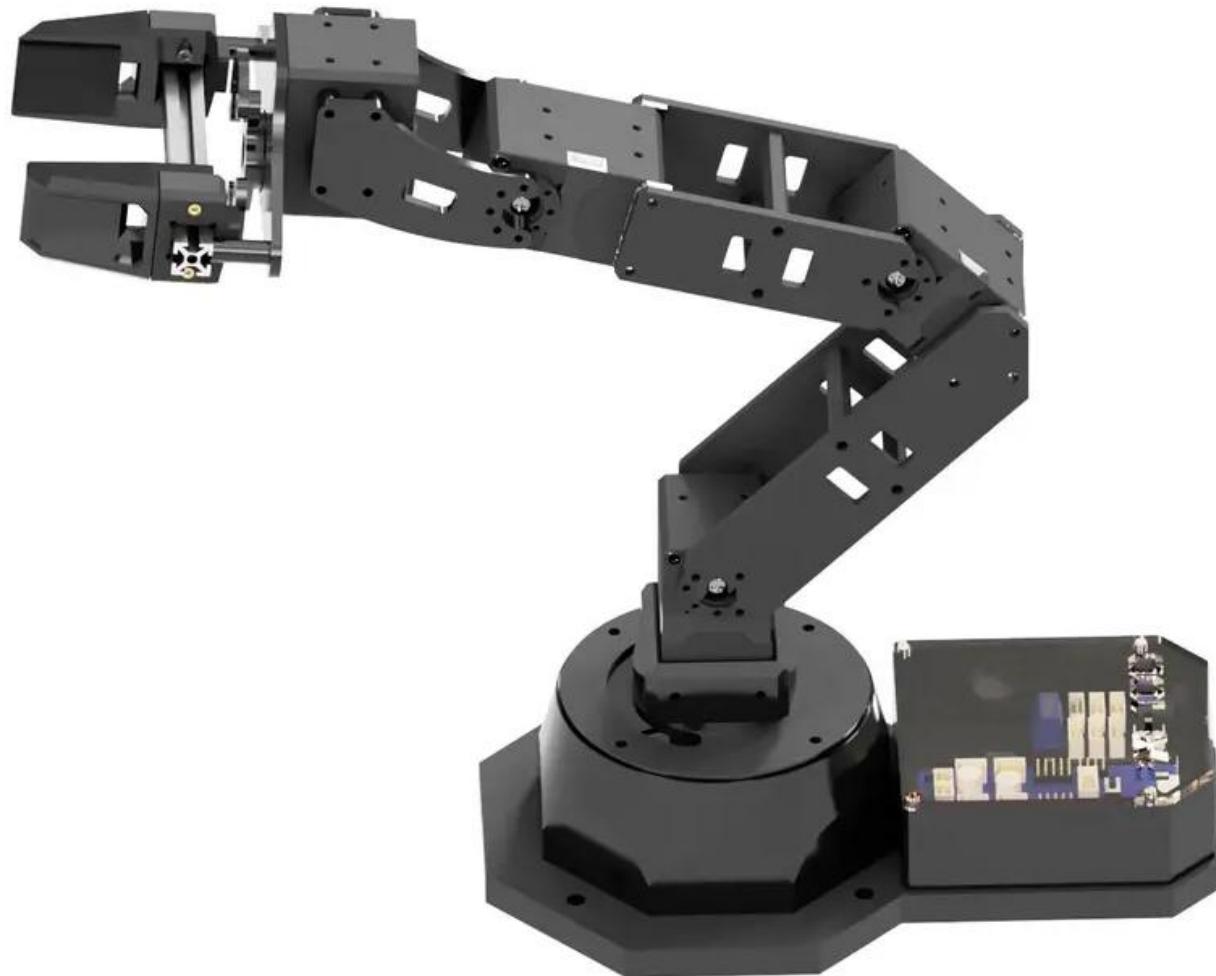
2

Platform



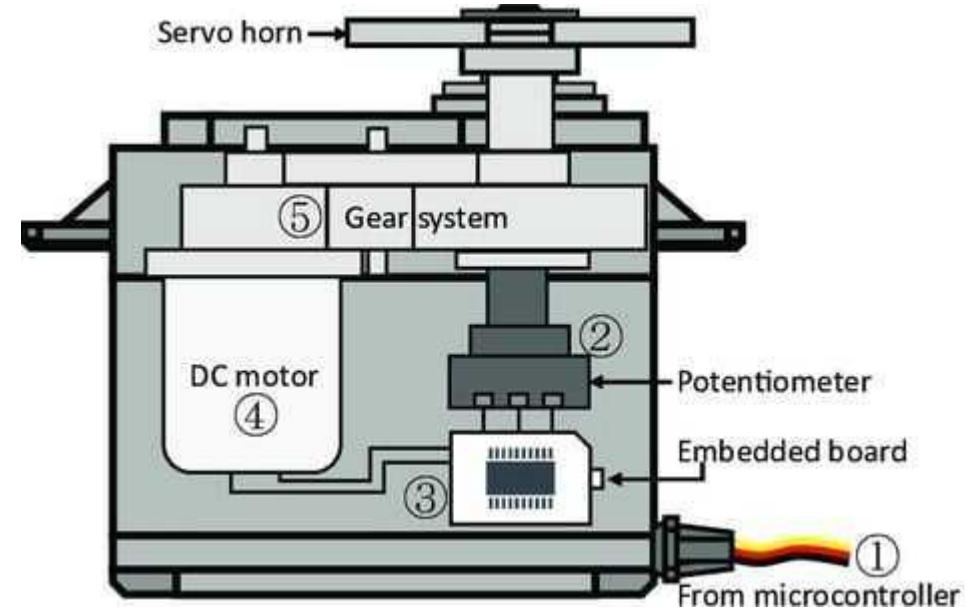
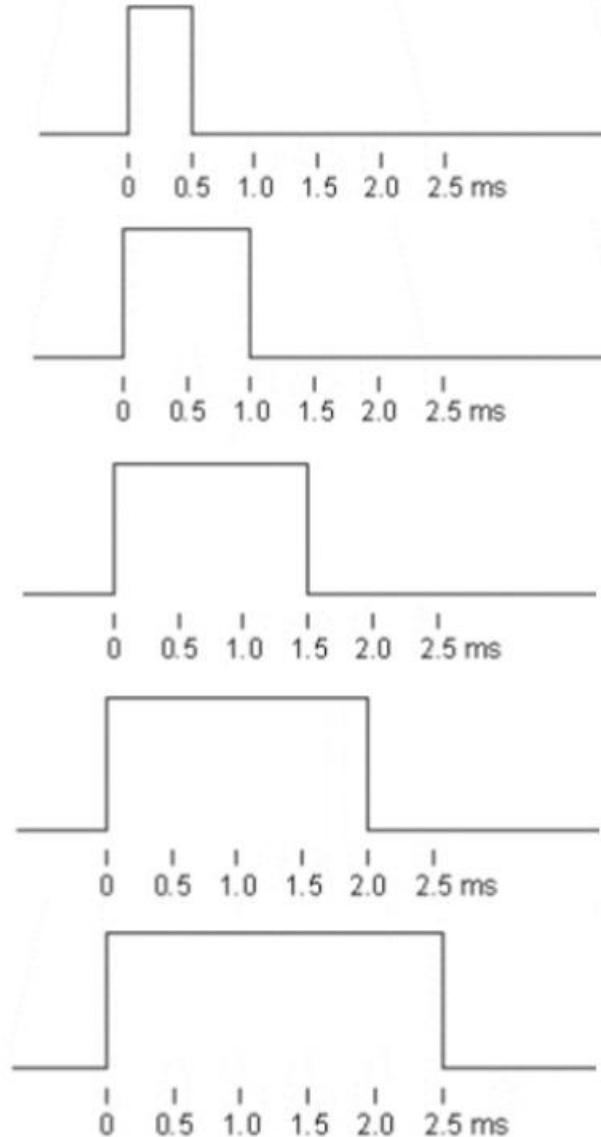
2

Platform



2

Platform



2

Platform

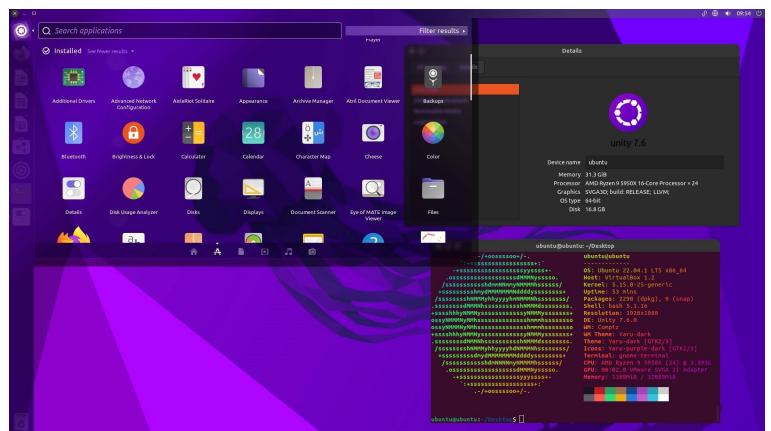
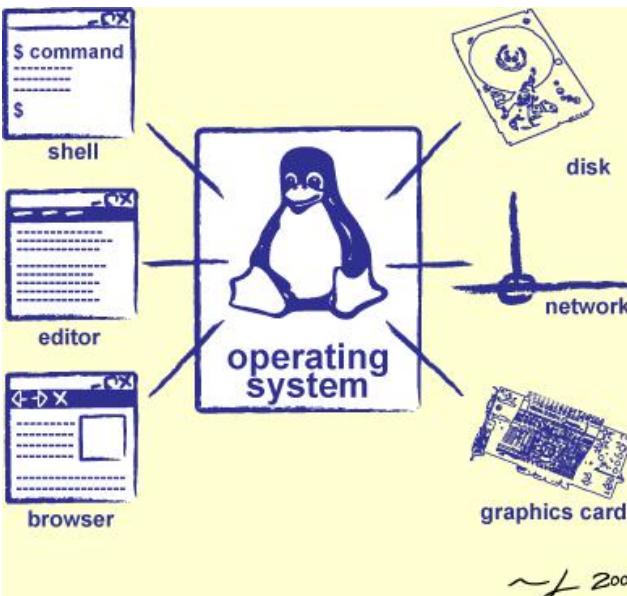


3

Basic Knowledge



Windows



Linux

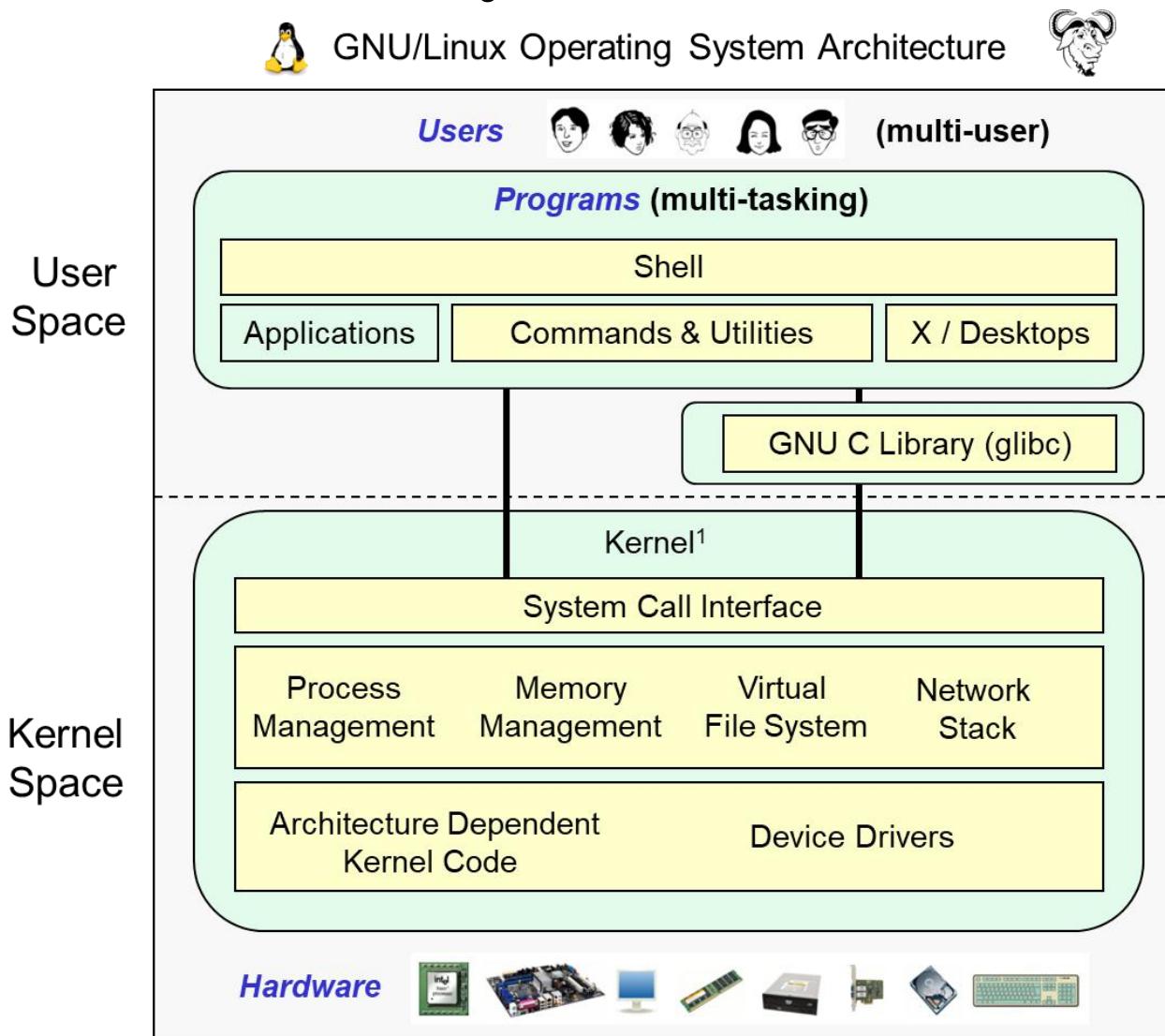


Mac OS



Chrome OS

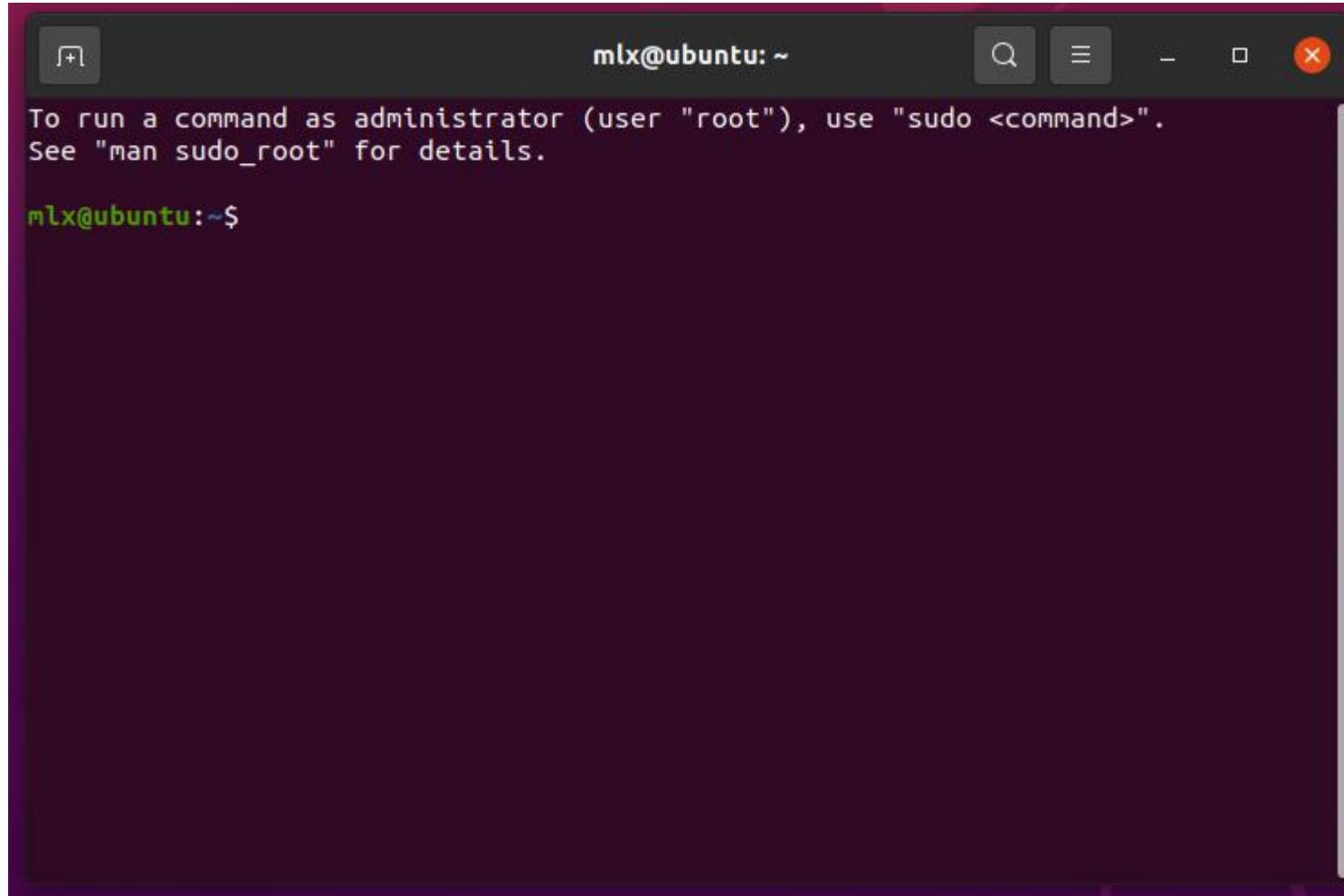
UNIX System Structure



3

Basic Knowledge

Shell: 与内核交互的文字接口

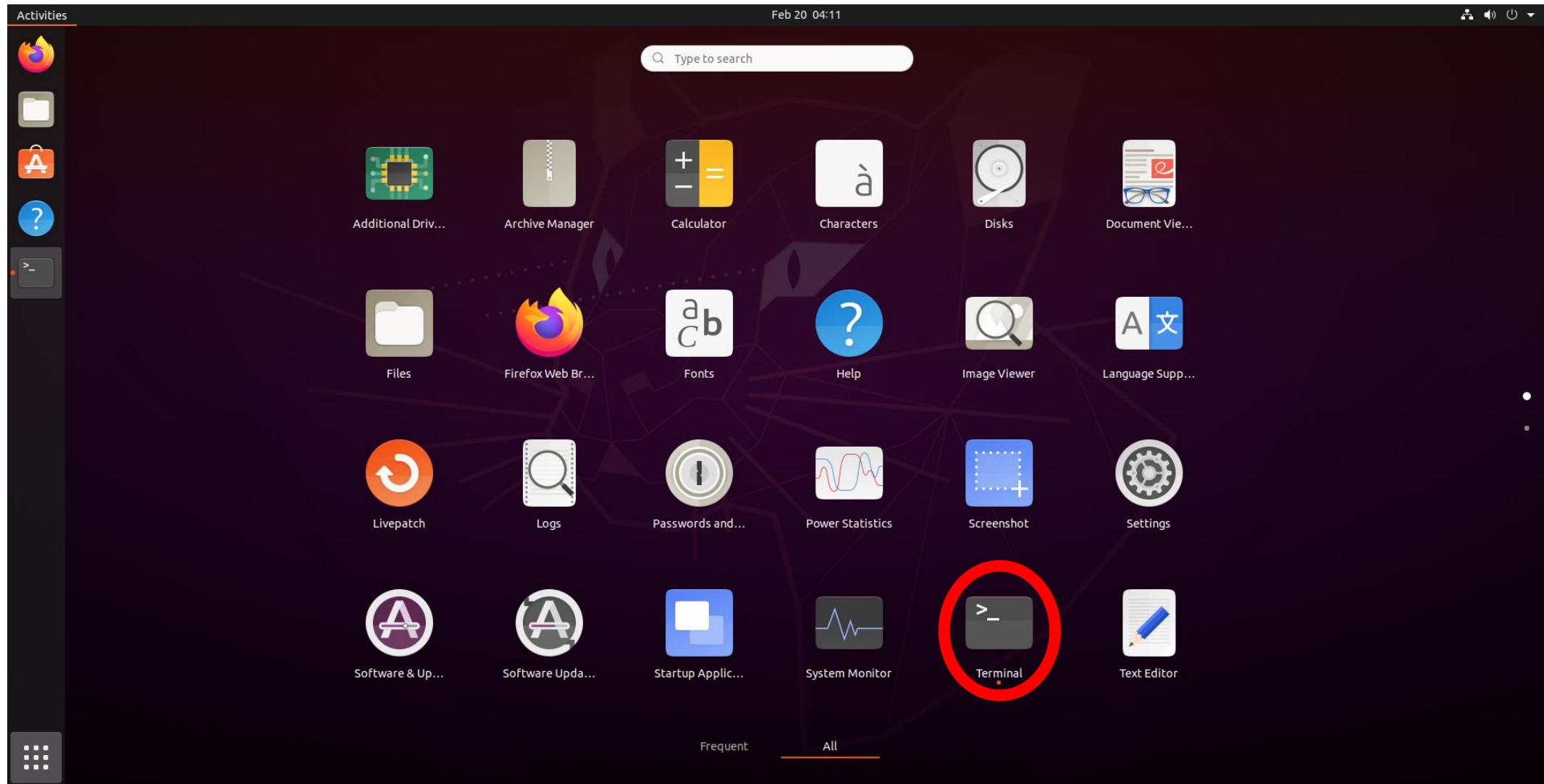


Ctrl + Alt + T

3

Basic Knowledge

Shell: 与内核交互的文字接口



3

Basic Knowledge

Unix/Linux 命令参考

文件命令	系统信息
<code>ls</code> - 列出目录	<code>date</code> - 显示当前日期和时间
<code>ls -al</code> - 使用格式化列出隐藏文件	<code>cal</code> - 显示当月的日历
<code>cd dir</code> - 更改目录到 <code>dir</code>	<code>uptime</code> - 显示系统从开机到现在所运行的时间
<code>cd</code> - 更改到 home 目录	<code>w</code> - 显示登录的用户
<code>pwd</code> - 显示当前目录	<code>whoami</code> - 查看你的当前用户名
<code>mkdir dir</code> - 创建目录 <code>dir</code>	<code>finger user</code> - 显示 <code>user</code> 的相关信息
<code>rm file</code> - 删除 <code>file</code>	<code>uname -a</code> - 显示内核信息
<code>rm -r dir</code> - 删除目录 <code>dir</code>	<code>cat /proc/cpuinfo</code> - 查看 cpu 信息
<code>rm -f file</code> - 强制删除 <code>file</code>	<code>cat /proc/meminfo</code> - 查看内存信息
<code>rm -rf dir</code> - 强制删除目录 <code>dir</code> *	<code>man command</code> - 显示 <code>command</code> 的说明手册
<code>cp file1 file2</code> - 将 <code>file1</code> 复制到 <code>file2</code>	<code>df</code> - 显示磁盘占用情况
<code>cp -r dir1 dir2</code> - 将 <code>dir1</code> 复制到 <code>dir2</code> ; 如果 <code>dir2</code> 不存在则创建它	<code>du</code> - 显示目录空间占用情况
<code>mv file1 file2</code> - 将 <code>file1</code> 重命名或移动到 <code>file2</code> ; 如果 <code>file2</code> 是一个存在的目录则将 <code>file1</code> 移动到目录 <code>file2</code> 中	<code>free</code> - 显示内存及交换区占用情况
<code>ln -s file link</code> - 创建 <code>file</code> 的符号连接 <code>link</code>	
<code>touch file</code> - 创建 <code>file</code>	
<code>cat > file</code> - 将标准输入添加到 <code>file</code>	
<code>more file</code> - 查看 <code>file</code> 的内容	
<code>head file</code> - 查看 <code>file</code> 的前 10 行	
<code>tail file</code> - 查看 <code>file</code> 的后 10 行	
<code>tail -f file</code> - 从后 10 行开始查看 <code>file</code> 的内容	
进程管理	压缩
<code>ps</code> - 显示当前的活动进程	<code>tar cf file.tar files</code> - 创建包含 <code>files</code> 的 tar 文件
<code>top</code> - 显示所有正在运行的进程	<code>file.tar</code>
<code>kill pid</code> - 杀掉进程 id <code>pid</code>	<code>tar xf file.tar</code> - 从 <code>file.tar</code> 提取文件
<code>killall proc</code> - 杀掉所有名为 <code>proc</code> 的进程*	<code>tar cxf file.tar.gz files</code> - 使用 Gzip 压缩创建 tar 文件
<code>bg</code> - 列出已停止或后台的作业	<code>tar xzf file.tar.gz</code> - 使用 Gzip 提取 tar 文件
<code>fg</code> - 将最近的作业带到前台	<code>tar cjf file.tar.bz2</code> - 使用 Bzip2 压缩创建 tar 文件
<code>fg n</code> - 将作业 <code>n</code> 带到前台	<code>tar xjf file.tar.bz2</code> - 使用 Bzip2 提取 tar 文件
文件权限	网络
<code>chmod octal file</code> - 更改 <code>file</code> 的权限	<code>ping host</code> - ping <code>host</code> 并输出结果
● 4 - 读 (r)	<code>whois domain</code> - 获取 <code>domain</code> 的 whois 信息
● 2 - 写 (w)	<code>dig domain</code> - 获取 <code>domain</code> 的 DNS 信息
● 1 - 执行 (x)	<code>dig -x host</code> - 逆向查询 <code>host</code>
示例:	<code>wget file</code> - 下载 <code>file</code>
<code>chmod 777</code> - 为所有用户添加读、写、执行权限	<code>wget -c file</code> - 断点续传
<code>chmod 755</code> - 为所有者添加 rwx 权限, 为组和其他用户添加 rx 权限	
更多选项参阅 <code>man chmod</code> .	
SSH	安装
<code>ssh user@host</code> - 以 <code>user</code> 用户身份连接到 <code>host</code>	从源代码安装: <code>./configure</code>
<code>ssh -p port user@host</code> - 在端口 <code>port</code> 以 <code>user</code> 用户身份连接到 <code>host</code>	<code>make</code>
<code>ssh-copy-id user@host</code> - 将密钥添加到 <code>host</code> 以实现无密码登录	<code>make install</code>
搜索	快捷键
<code>grep pattern files</code> - 搜索 <code>files</code> 中匹配 <code>pattern</code> 的内容	<code>Ctrl+C</code> - 停止当前命令
<code>grep -r pattern dir</code> - 递归搜索 <code>dir</code> 中匹配 <code>pattern</code> 的内容	<code>Ctrl+Z</code> - 停止当前命令, 并使用 <code>fg</code> 恢复
<code>command grep pattern</code> - 搜索 <code>command</code> 输出中匹配 <code>pattern</code> 的内容	<code>Ctrl+D</code> - 注销当前会话, 与 <code>exit</code> 相似

FOSSwire.com

* 小心使用。
翻译/Tony <<http://LinuxTOY.org>>





Linux发行版

- Linux 发行版（Linux distribution）为一般用户预先集成好了Linux内核及各种应用软件
- 典型的Linux发行版包括Linux内核、GNU工具和库、附加软件、文档、窗口系统(最常见的是X窗口系统，或者最近的Wayland)、窗口管理器和桌面环境

3

Basic Knowledge

软件包管理系统 —— APT

apt 常用命令

- 列出所有可更新的软件清单命令: `sudo apt update`
- 升级软件包: `sudo apt upgrade`
列出可更新的软件包及版本信息: `apt list --upgradeable`
升级软件包, 升级前先删除需要更新软件包: `sudo apt full-upgrade`
- 安装指定的软件命令: `sudo apt install <package_name>`
安装多个软件包: `sudo apt install <package_1> <package_2> <package_3>`
- 更新指定的软件命令: `sudo apt update <package_name>`
- 显示软件包具体信息, 例如: 版本号, 安装大小, 依赖关系等等: `sudo apt show <package_name>`
- 删除软件包命令: `sudo apt remove <package_name>`
- 清理不再使用的依赖和库文件: `sudo apt autoremove`
- 移除软件包及配置文件: `sudo apt purge <package_name>`
- 查找软件包命令: `sudo apt search <keyword>`
- 列出所有已安装的包: `apt list --installed`
- 列出所有已安装的包的版本信息: `apt list --all-versions`

3

Basic Knowledge

Mirror of APT Source

```
mlx@ubuntu:~$ cat /etc/apt/sources.list
#deb cdrom:[Ubuntu 20.04.5 LTS _Focal Fossa_ - Release amd64 (20220831)]/ focal main restricted
# See http://help.ubuntu.com/community/UpgradeNotes for how to upgrade to
# newer versions of the distribution.
deb http://us.archive.ubuntu.com/ubuntu/ focal main restricted
# deb-src http://us.archive.ubuntu.com/ubuntu/ focal main restricted
## Major bug fix updates produced after the final release of the
## distribution.
deb http://us.archive.ubuntu.com/ubuntu/ focal-updates main restricted
# deb-src http://us.archive.ubuntu.com/ubuntu/ focal-updates main restricted
## N.B. software from this repository is ENTIRELY UNSUPPORTED by the Ubuntu
## team. Also, please note that software in universe WILL NOT receive any
## review or updates from the Ubuntu security team.
deb http://us.archive.ubuntu.com/ubuntu/ focal universe
# deb-src http://us.archive.ubuntu.com/ubuntu/ focal-updates universe
## N.B. software from this repository is ENTIRELY UNSUPPORTED by the Ubuntu
## team, and may not be under a free licence. Please satisfy yourself as to
## your rights to use the software. Also, please note that software in
## multiverse WILL NOT receive any review or updates from the Ubuntu
## security team.
deb http://us.archive.ubuntu.com/ubuntu/ focal multiverse
# deb-src http://us.archive.ubuntu.com/ubuntu/ focal multiverse
deb http://us.archive.ubuntu.com/ubuntu/ focal-updates multiverse
# deb-src http://us.archive.ubuntu.com/ubuntu/ focal-updates multiverse
## N.B. software from this repository may not have been tested as
## extensively as that contained in the main release, although it includes
## newer versions of some applications which may provide useful features.
## Also, please note that software in backports WILL NOT receive any review
## or updates from the Ubuntu security team.
deb http://us.archive.ubuntu.com/ubuntu/ focal-backports main restricted universe multiverse
# deb-src http://us.archive.ubuntu.com/ubuntu/ focal-backports main restricted universe multiverse
```

SUSTech Mirror



SUSTech Open Source Mirrors

- [Julia Releases Mirror](#)
- [Linux Mint Mirror](#)
- [Manjaro Mirror](#)
- [OpenSUSE Mirror](#)
- [OpenWRT \(LEDE\) Mirrors](#)
- [PyPI Mirror](#)
- [Raspberrypi Mirror](#)
- [Raspbian Mirror](#)
- [ROS Mirror](#)
- [ROS2 Mirror](#)
- [Ubuntu Mirror](#)
- [Ubuntu-ports Mirror](#)
- [Zerotier Mirror](#)

Ubuntu Mirror

Introduction

Ubuntu is a popular and user-friendly Linux distribution based on Debian.

Backup Existing Configuration

```
sudo cp -a /etc/apt/sources.list /etc/apt/sources.list.bak
```

Edit Configuration

```
sudo sed -i "s@http://.*archive.ubuntu.com@https://mirrors.sustech.edu.cn@g" /etc/apt/source
sudo sed -i "s@http://.*security.ubuntu.com@https://mirrors.sustech.edu.cn@g" /etc/apt/source
```

Refresh Repository Indexes

```
sudo apt-get update
```

[Edit on GitHub](#)

Last Updated: 2021-08-18 15:42

Tuna Mirror - A More Stable Choice

 清华大学开源软件镜像站

HOME EVENTS BLOG RSS PODCAST MIRRORS

AOSP
Adoptium
CPAN
CRAN
CTAN
CocoaPods
NetBSD
OpenBSD
OpenMediaVault
alpine
anaconda
anthon
arch4edu
archlinux
archlinuxarm
archlinuxcn
armbian
bazel-apt
binutils-gdb.git
bioconductor
blackarch
centos

Ubuntu 软件仓库

线路选择

是否使用 HTTPS
 是否使用 sudo

本镜像仅包含 32/64 位 x86 架构处理器的软件包，在 ARM(arm64, armhf)、PowerPC(ppc64el)、RISC-V(riscv64) 和 S390x 等架构的设备上（对应官方源为 ports.ubuntu.com）请使用 [ubuntu-ports 镜像](#)。

对于 Ubuntu 不再支持的版本，请参考 [Ubuntu 旧版本帮助](#)。

在 Ubuntu 24.04 之前，Ubuntu 的软件源配置文件使用传统的 One-Line-Style，路径为 [/etc/apt/sources.list](#)；从 Ubuntu 24.04 开始，Ubuntu 的软件源配置文件变更为 DEB822 格式，路径为 [/etc/apt/sources.list.d/ubuntu.sources](#)。

将系统自带的对应文件做个备份，然后根据格式的选择下面对应的内容替换，即可使用选择的软件源镜像。

传统格式 ([/etc/apt/sources.list](#))

Ubuntu 版本

启用源码源
 启用 proposed
 强制安全更新使用镜像

```
# 默认注释了源码镜像以提高 apt update 速度，如有需要可自行取消注释
deb https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy main restricted universe multiverse
# deb-src https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy main restricted universe multiverse
deb https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy-updates main restricted universe multiverse
# deb-src https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy-updates main restricted universe multiverse
deb https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy-backports main restricted universe multiverse
# deb-src https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy-backports main restricted universe multiverse

# 以下安全更新软件源包含了官方源与镜像站配置，如有需要可自行修改注释切换
deb http://security.ubuntu.com/ubuntu/ jammy-security main restricted universe multiverse
# deb-src http://security.ubuntu.com/ubuntu/ jammy-security main restricted universe multiverse

# 预发布软件源，不建议启用
# deb https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy-proposed main restricted universe multiverse
# deb-src https://mirrors.tuna.tsinghua.edu.cn/ubuntu/ jammy-proposed main restricted universe multiverse
```

ROS - Robot Operating System

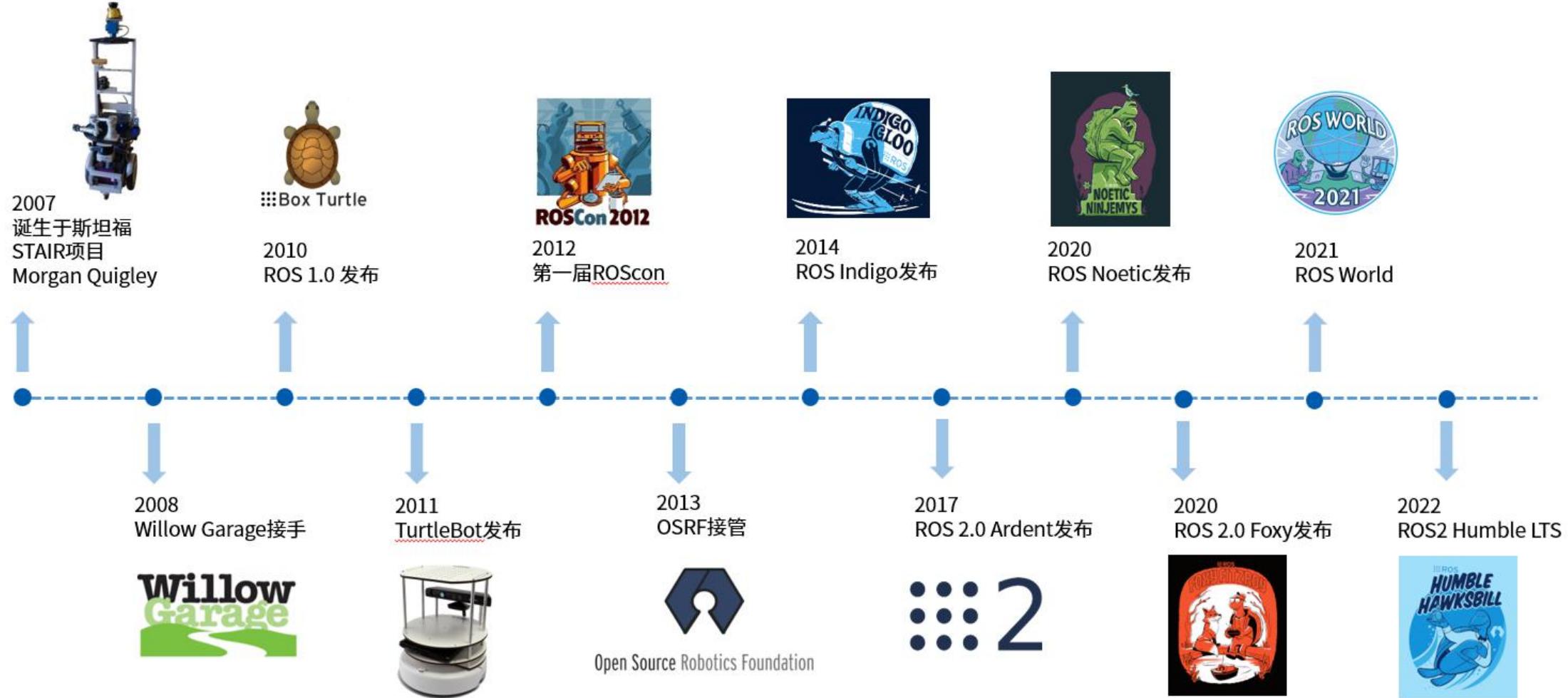
- A “Meta” Operating System.
 - Open source
 - Runs in Linux (esp. Ubuntu)
- Agent based (nodes)
- Message Passing
 - Publish
 - Subscribe
 - Services via remote invocation
- Supports numerous programming languages (C++, Python, Lisp, Java)



[ROS: Home](#)

3

Basic Knowledge



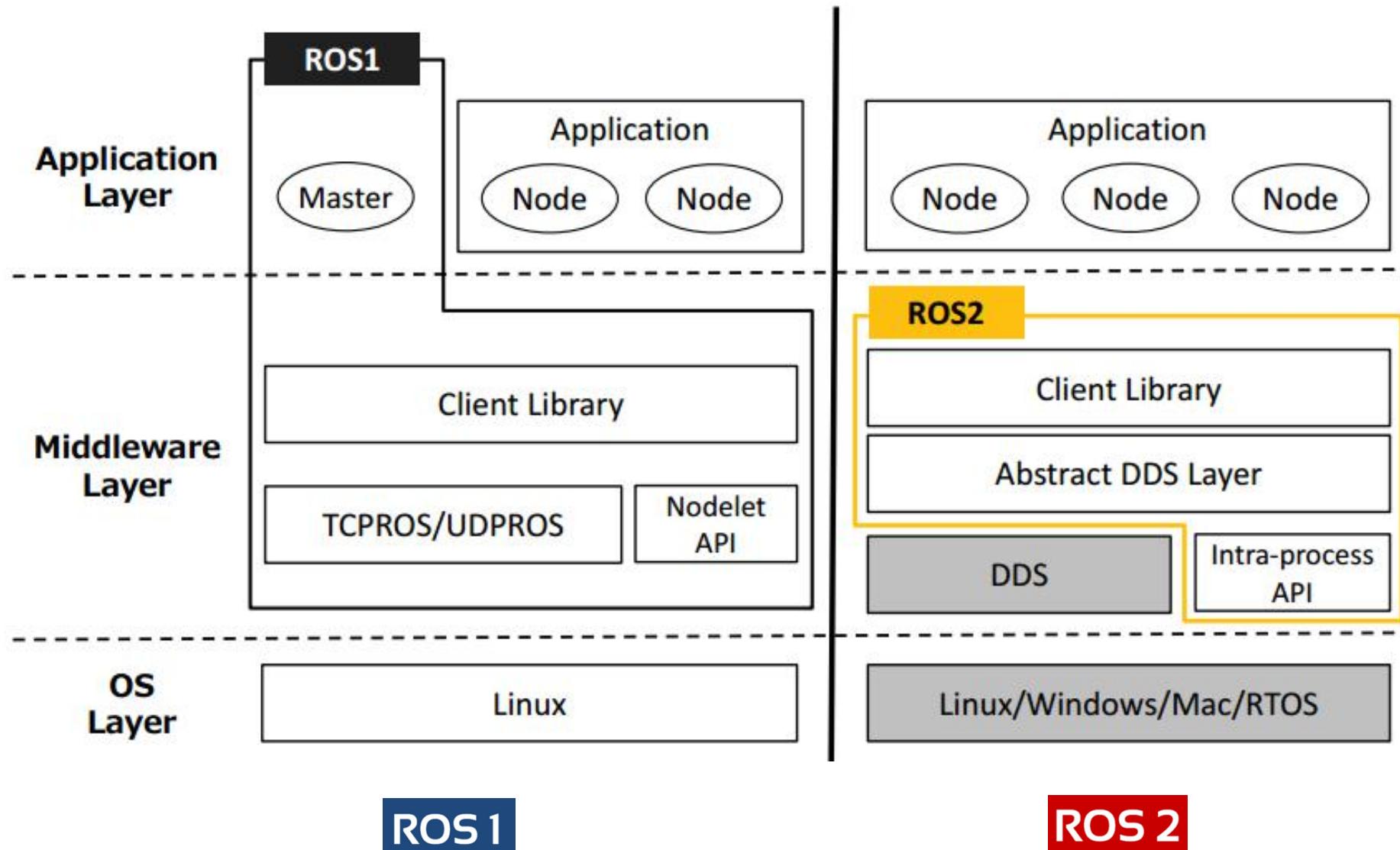
3

Basic Knowledge



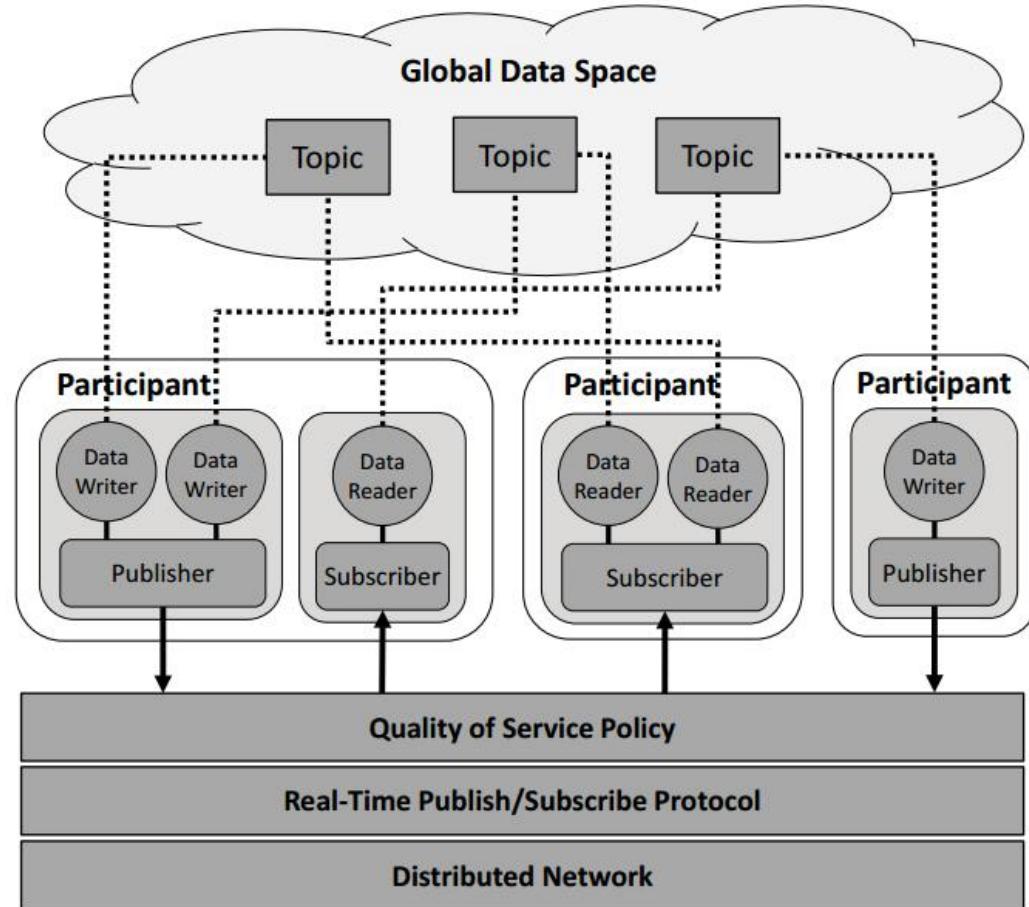
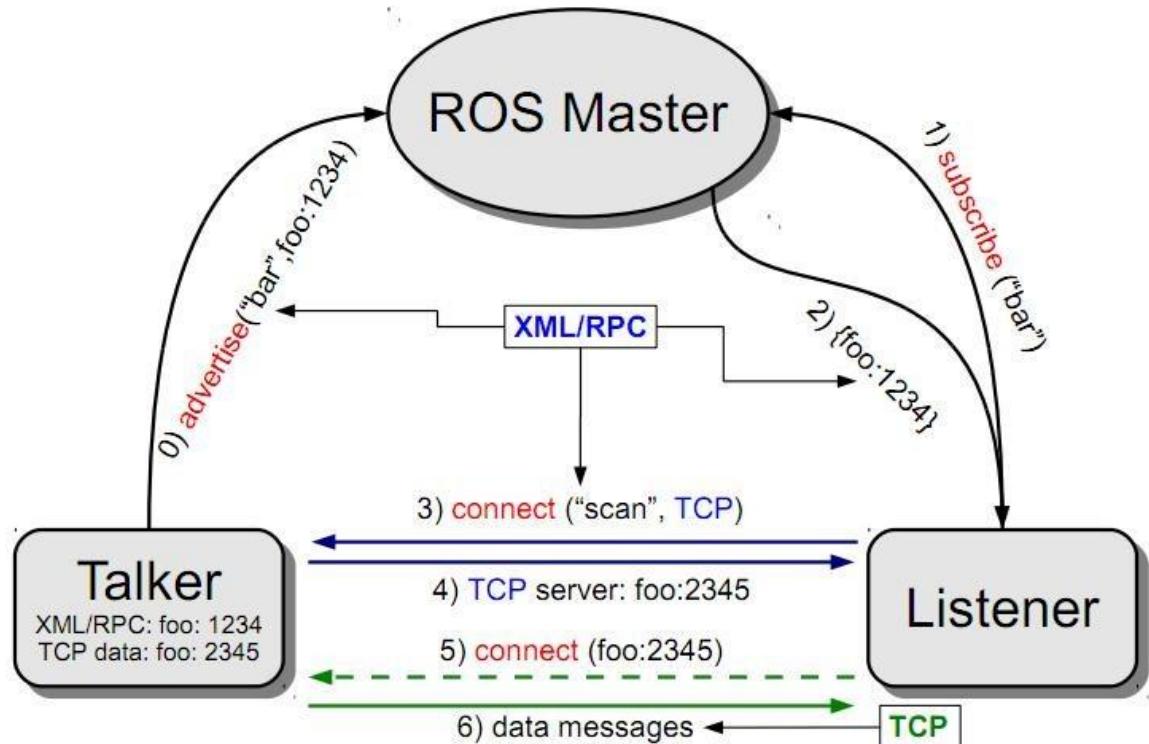
3

Basic Knowledge



3

Basic Knowledge



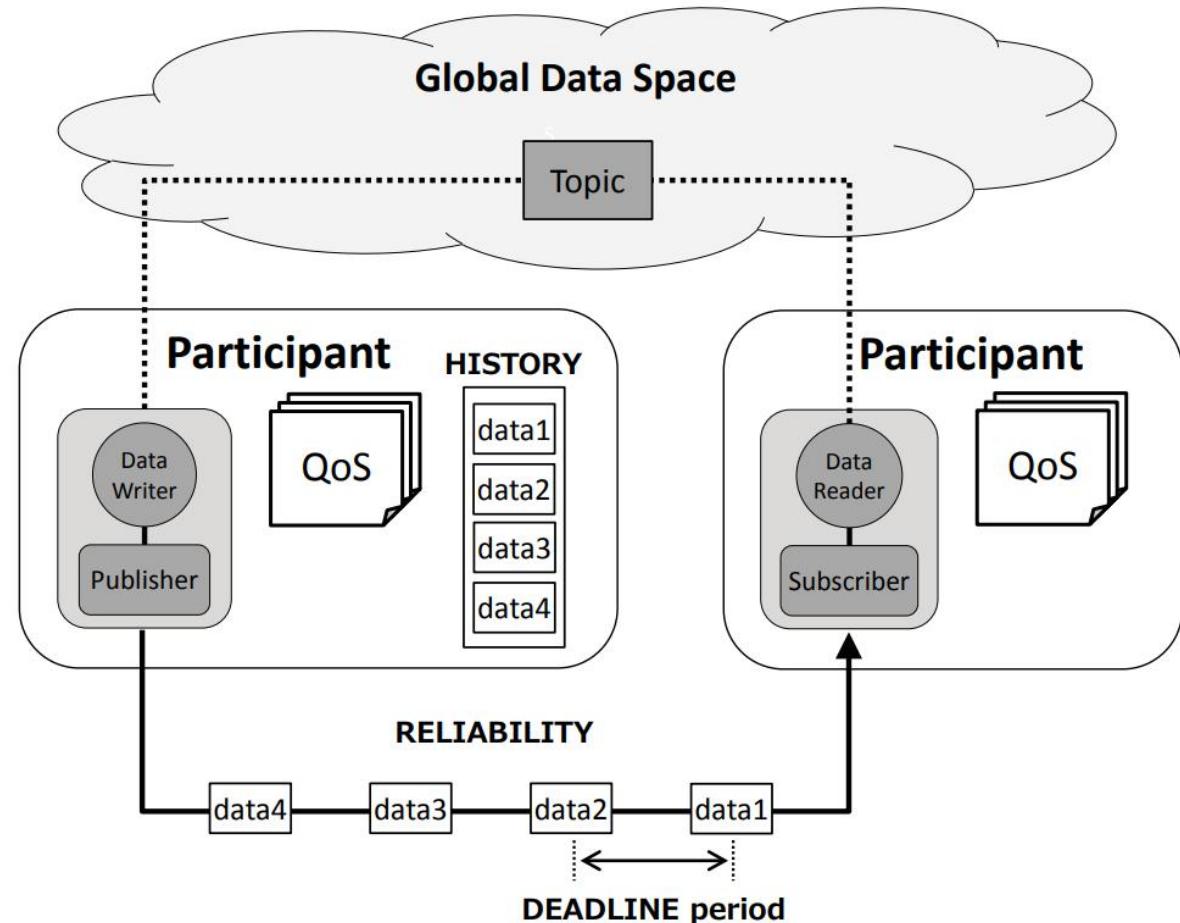
ROS 1

ROS 2

实时性增强：数据必须在deadline之前完成更新。

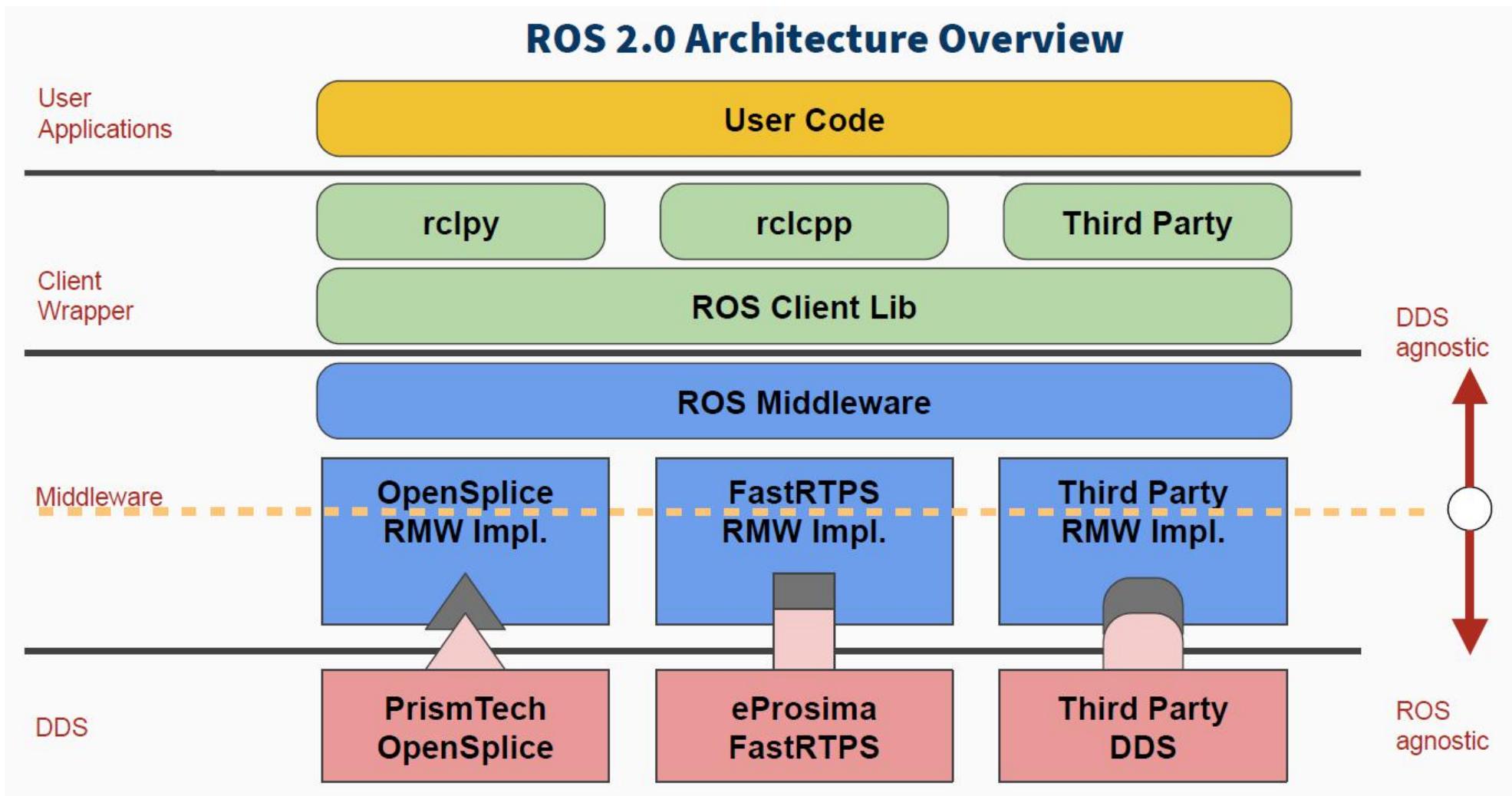
持续性增强：ROS1尽管存在数据队列的概念，但是还有很大的局限，订阅者无法接收到加入网络之前的数据；DDS可以为ROS提供数据历史的服务，就算新加入的节点，也可以获取发布的所有历史数据。

可靠性增强：通过DDS配置可靠性原则，用户可以根据需求选择性能模式（BEST EFFORT）或者稳定模式（RELIABLE）。



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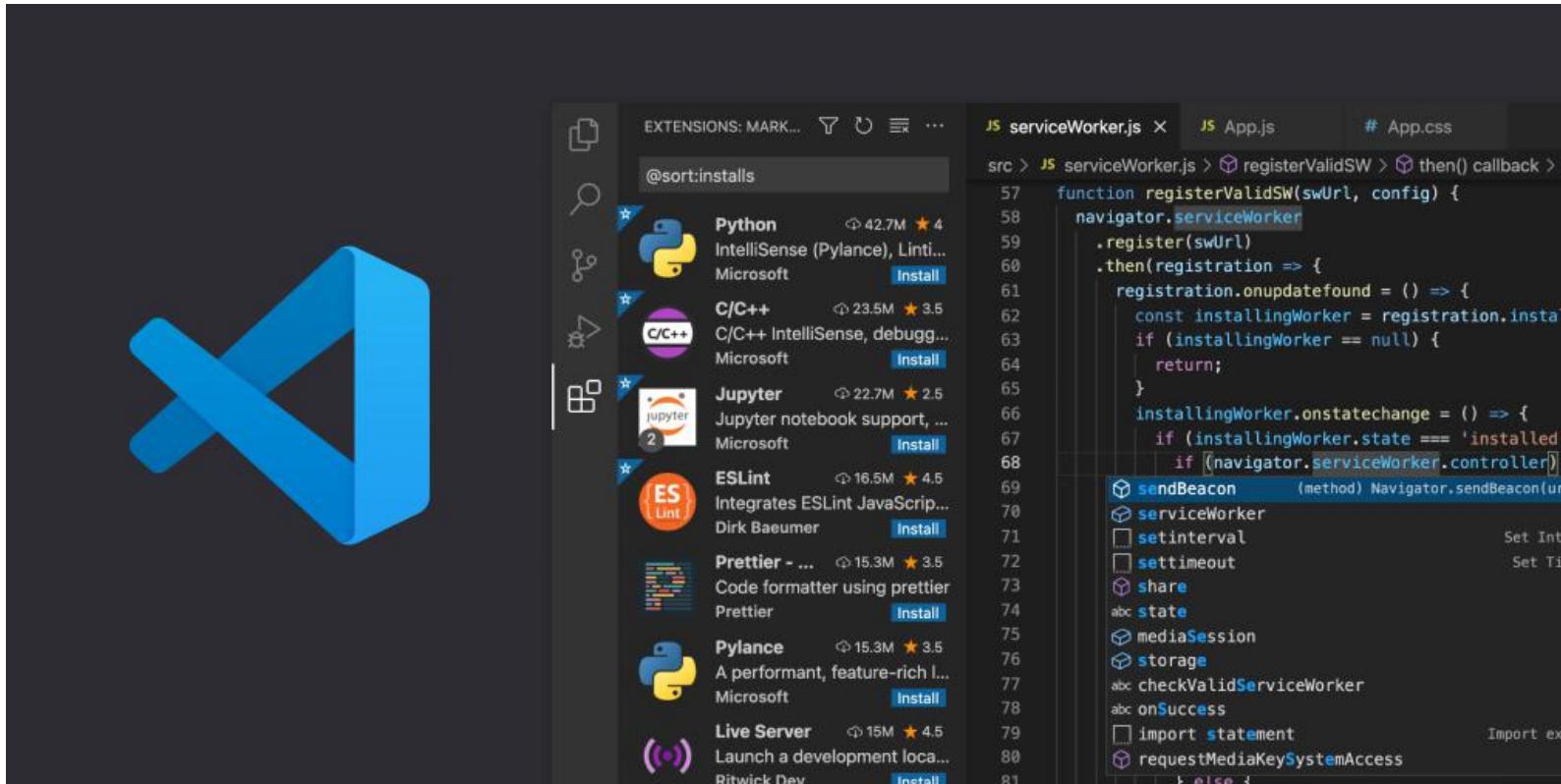
Basic Knowledge



4

Tools

Visual Studio Code

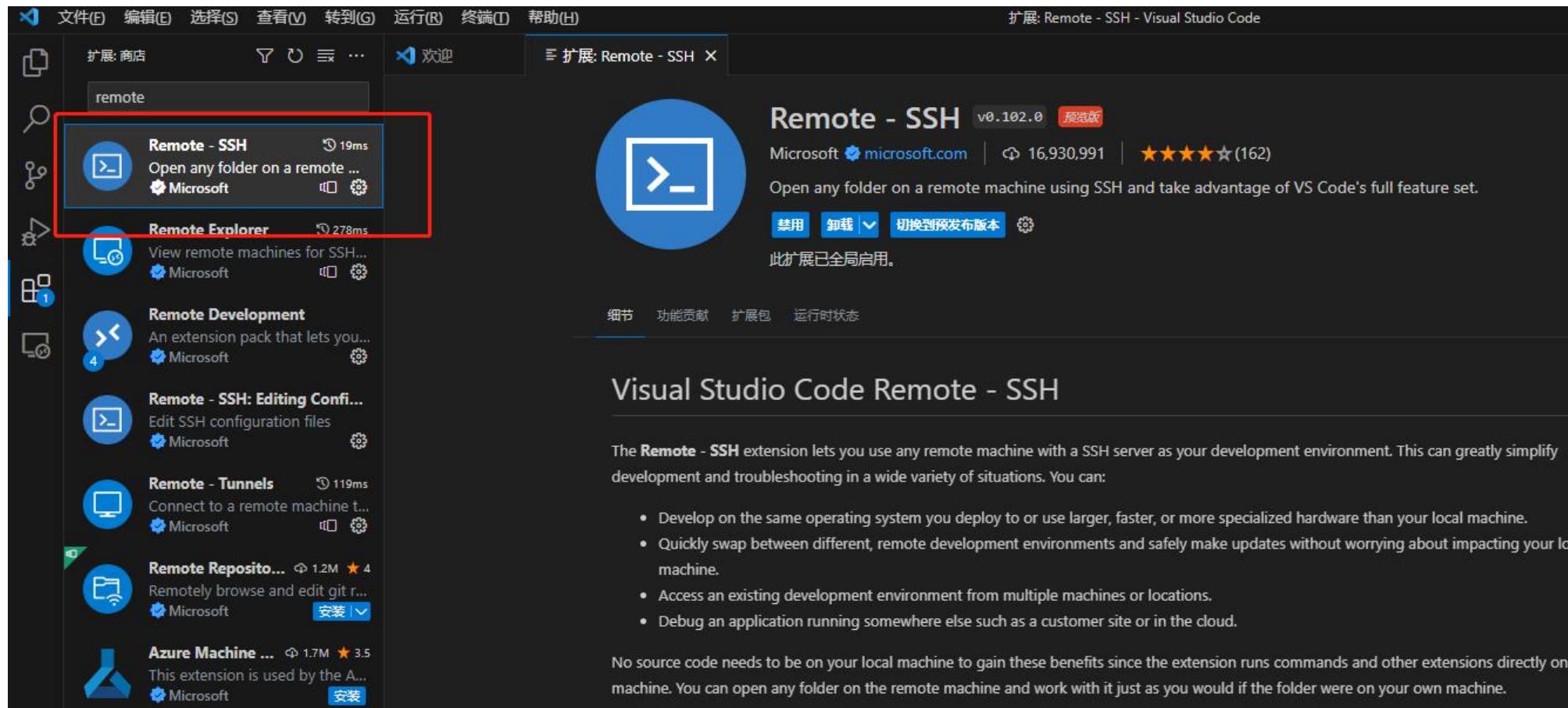


<https://code.visualstudio.com/Download>

4

Tools

SSH



Programming Languages

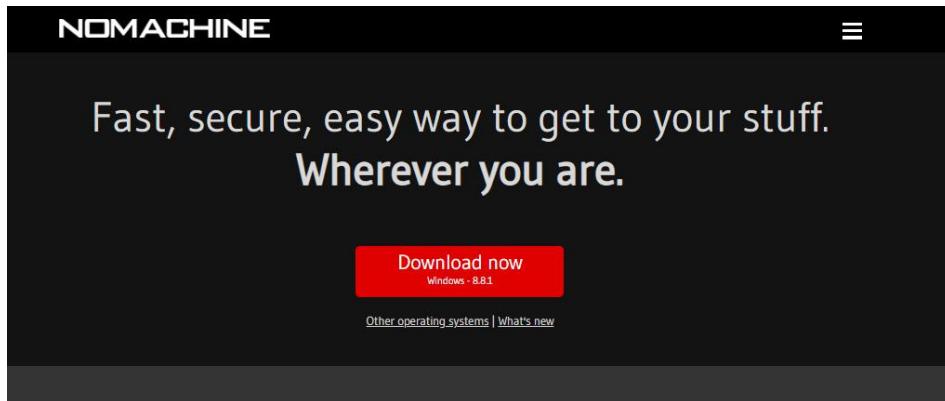


<https://www.w3schools.com/python/default.asp>



<https://www.w3cschool.cn/cpp/>

Remote Desktop in Local Area Network



Remote Access for Everybody
NoMachine is free for everybody to use



Connect to any computer remotely at the speed of light. Thanks to our NX technology, NoMachine is the fastest and highest quality remote desktop you have ever tried. Reach your computer on the other side of the world in just a few clicks. Wherever your desktop is, you can access it from any other device and share it with who you want. NoMachine is your own personal server, private and secure. What's more, it's free.



<https://www.nomachine.com/>



南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

Thanks for
Listening