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| --- | --- | --- | --- | --- |
| **float** | **半精度** | **S (1), E (5), M (10)：CPU不支持** | | |
| **单精度** | **S (1), E (8), M (23)** | | |
| **计算** | **正常** |  | |
| **指数全0** |  | |
| **指数全1** | **小数全0** |  |
| **小数不全0** |  |



**Linux：**

**计算机硬件：运算器、控制器、存储器、输入设备、输出设备**

**存储单位：KB = K Byte**

**速度单位：M / s = M bit / s**

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| **nvidia-smi -l** | **查看显卡信息** |

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| **Xshell快捷键：** | | | | | |
| **Ctrl + C** | **终止** | **Ctrl + Ins** | **复制** | **Shift + Ins** | **粘贴** |

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| --- | --- | --- | --- |
| **命令** | **cd <path>** | **转移工作目录** | |
| **pwd** | **当前工作目录** | |
| **time <exe>** | **测试运行耗时** | |
| **环境** | **export <var>=<value>** | **设置环境变量** | |
| **unset <var>** | **取消环境变量** | |
| **env** | **查看环境变量** | |
| **source <exe>** | **在当前进程执行程序** | |
| **whereis <key>** | **环境变量中查找文件** | |
| **用户** | **who** | **在线用户** | |
| **whoami** | **我的用户** | |
| **useradd <usr>** | **创建用户** | |
| **passwd <usr>** | **设置密码** | |
| **chmod <ugoa>{+ | -}<rwx> <file>** | **设置权限** | |
| **文件** | **ls / ll / tree -a <path>...** | **文件** | **列表** |
| **cat <file>** | **内容** |
| **find <path> -name <file>** | **查找文件 (通配符\*)** | |
| **locate <key>** |
| **mv <old> <new>** | **剪切文件** | |
| **du -sh <dir>** | **目录大小** | |
| **cp <old> <new>** | **拷贝** | **文件** |
| **cp -r <old> <new>** | **目录** |
| **mkdir -p <path>** | **创建** | **多级目录** |
| **touch <file>** | **文件** |
| **rmdir <path>** | **删除** | **空目录** |
| **rm -rf <path>** | **文件 / 目录** |
| **ln -s <src> <dst>** | **创建链接 (默认hard)** | |
| **unzip <\*.zip>** | **解压文件** | |
| **进程** | **top / lsof** | **进程占用信息** | |
| **kill -9 <pid>** | **终止进程** | |
| **输出** | **clear** | **清除命令行** | |
| **echo** | **输出语句** | |
| **history** | **命令历史** | |
| **history -c** | **清除历史** | |
| **网络** | **ip addr** | **IP地址** | |
| **wget <url>** | **下载文件** | |
| **apt install <pack>** | **安装包** | |
| **aptitude install <pack>** | **安装包 (冲突时)** | |
| **链接** | **ldd <\*.so>** | **查看链接的动态库列表** | |
| **nm -D <\*.so>** | **查看符号表** | |

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| **压缩tar：** | | | | |
| **tar -xf <\*.tar>** | | | | **解压** |
| **tar -cf <\*.tar> <src>** | | | | **压缩** |
| **tar -uf <\*.tar> <src>** | | | | **更新** |
| **tar -tf <\*.tar>** | | | | **查看** |
| **tar -rf <\*.tar> <src>** | | | | **追加** |
| **-z** | **gzip特性** | **-v** | **显示** |  |

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| **文件编辑vim：** | | | | | |
| **dd** | **删除本行** | **i** | **编辑模式** | **u** | **撤销操作** |
| **:q** | **不保存退出** | **:wq** | **写入保存** |  |  |

**sudo gedit <file>**

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| **文件阅读more：** | | | | | |
| **ENTER** | **下一行** | **SPACE** | **下一页** | **b** | **上一页** |
| **q** | **退出** | **h** | **帮助** |  |  |

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| **多命令行tmux：** | | |
| **全局** | **tmux new -d -s <name>** | **创建会话** |
| **tmux ls** | **会话列表** |
| **tmux attach -t <name>** | **进入会话** |
| **tmux kill-session -t <name>** | **结束会话** |
| **局部** | **tmux selectp -t <idx>** | **选中窗口** |
| **tmux send-keys "cmd" Enter** | **执行** |
| **tmux splitw {-v | -h} -p <percentage>** | **分割** |
| **快捷键** | **Ctrl + D** | **退出** |

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| **环境变量：** | |
| **<key>=<value>** | **定义变量** |
| **$<key>** | **解析变量** |

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| **特殊字符：** | | | | | | | | | | | |
| **.** | **当前目录** | **..** | **上级目录** | **\*** | **通配符** | **|** | **传递参数** | **$** | **当前进程** | **{ }** | **集合** |
| **/** | **根目录** | **~** | **用户目录** |  |  |  |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **文件位置：** | | |
| **/opt** | | **额外软件** |
| **/proc/cpuinfo** | | **CPU配置** |
| **/etc/environment** | | **系统变量** |
| **/etc/sysconfig/network-scripts/ifcfg-ens33** | | **网络配置** |
| **BOOTPROTO=static** | **ONBOOT=yes** | **DNS1=114.114.114.114** |
| **GATEWAY=(网关)** | **IPADDR=(子网IP)** | **NETMASK=(子网掩码)** |
| **/etc/resolv.conf** | | **网关配置** |
| **nameserver (网关)** | |  |
| **/etc/selinux/config** | | **安装限制** |
| **/etc/sysconfig/static-routes** | | **路由配置** |

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| **命令行 & 软件包：** | |
| **pdflatex** | **texlive** |

**Windows：**

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| --- | --- | --- |
| **软件** | calc | 计算器 |
| help | 帮助 |
| ipconfig /all | IP地址 |
| netstat | 活动连接 |
| **IO** | cls | 清屏 |
| %<var>% | 解析环境变量 |
| chcp 65001 | 使用UTF-8编码 |
| **文件** | copy <src\_file> <dst\_file> | 拷贝 |
| **目录** | cd <path> | 改变工作路径 |
| xcopy <src\_dir> <dst\_dir> /E /I | 拷贝 |
| rd /s /q <dir> | 强制删除文件夹 |

**git：**

**ssh-keygen：在Github添加公钥 \*.pub**

**stable (稳定)，latest (最新)，master (主干)，dev (开发)，testing (测试)**

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| --- | --- | --- | --- |
| **git config** | | | |
| **位置** | **--system** | **系统 ~/Git/etc/gitconfig** | |
| **--global** | **全局 C:/Users/huawei/.gitconfig** | |
| **user.name** | **用户名** |
| **user.email** | **用户邮箱** |
| **--local** | **仓库 ~/.git/config** | |
| **core.sparsecheckout** | **稀疏签出 (指定签出目录**  **~/.git/info/sparse-checkout)** |
| **方法** | **-l** | **属性列表** | |
| **--add <key> <value>** | **添加属性** | |
| **--unset <key>** | **移除属性** | |



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| --- | --- | --- |
| **创建** | **git init <path>** | **初始化仓库** |
| **git clone --recurse-submodules <url>** | **克隆仓库到当前目录** |
| **分支** | **git branch** | **查看 (-r 表远程)** |
| **git checkout <name>** | **切换 (-b 新建)** |
| **git branch -m <name>** | **重命名** |
| **git branch -d <name>** | **删除** |
| **签出** | **git checkout <path>** | **暂存区 → 本地** |
| **git sparse-checkout init/disable** | **启用/停用稀疏签出** |
| **git sparse-checkout list** | **文件列表** |
| **暂存** | **git ls-files** | **文件列表** |
| **git status <path>** | **文件状态 (.gitignore 文件白名单)** |
| **git add <path>** | **本地 → 暂存区** |
| **git commit -m <msg>** | **暂存区 → 仓库** |
| **仓库** | **git ls-files --with-tree=HEAD** | **文件列表** |
| **git rm <path>** | **删除文件** |
| **git log** | **获取版本信息** |
| **git checkout -f <vid>** | **回退到指定版本** |
| **git rm -r --cached <dir>** | **删除缓存** |
| **远程** | **git remote -v** | **查看关联关系** |
| **git remote add <name> <url>** | **关联远程仓库** |
| **git remote rm <name>** | **删除关联关系** |
| **git remote set-url <name> <url>** | **修改url** |
| **git remote rename <old> <new>** | **修改名称** |
| **git push -u <name> <branch>** | **仓库 → 远程 (分支名一致)** |
| **git pull <name> <branch>** | **远程 → 仓库 (分支名一致)** |
| **文件** | **git lfs install** | **附加大文件管理拓展** |
| **git lfs track/untrack <file>** | **修改文件跟踪状态** |
| **git lfs ls-files** | **文件列表** |
| **git lfs status** | **文件状态** |
| **子模块** | **git submodule init** | **初始化子模块** |
| **git submodule add <path> <url>** | **添加子模块** |
| **git submodule set-url <path> <url>** | **修改url** |

**docker：**

**{**

**"registry-mirrors": ["https://cr.console.aliyun.com/cn-hangzhou/instances/mirrors 获取加速器"]**

**}**

**Windows显示器：安装VcXsrv，环境变量DISPLAY = "host.docker.internal:0"**

|  |
| --- |
| **dockerFile：** |
| **FROM <image> # 镜像源**  **MAINTAINER <name> # 作者信息**  **RUN <cmd> # docker build时执行命令**  **CMD <cmd> # docker run时执行命令**  **ENTRYPOINT <cmd> # docker run时执行<ENTRYPOINT> "<CMD>"**  **ENV <key>=<value> # 环境变量**  **ARG <key>=<value> # docker build局部变量**  **USER <user> # 切换用户**  **VOLUME ["<c\_path>", "<c\_path>"] # 匿名数据卷**  **WORKDIR <c\_path> # 切换工作目录**  **ADD <url/.tar> <c\_path> # 解压压缩包到路径** |

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| **镜像** | **docker images** | **查看镜像列表 (-q只显示ID)** |
| **docker rmi <image>** | **删除镜像** |
| **docker tag <old> <new>** | **重命名镜像** |
| **docker search <image>** | **返回Docker Hub的搜索结果** |
| **docker pull <image:tag>** | **远程 → 仓库** |
| **docker build -f <dockerFile> -t <image:tag> .** | **根据dockerFile创建镜像** |
| **容器** | **docker ps -a** | **查看容器列表** |
| **docker rm <ctn>** | **删除容器** |
| **docker start/restart/stop/kill <ctn>** | **容器管理** |
| **docker exec -it <ctn> bash** | **进入容器的终端** |
| **docker run --name <name> -p <l\_port>:<c\_port>**  **-v <l\_path:c\_path:ro> --volume-from <ctn>**  **-it <image:tag> <bash>** | **镜像 → 容器** |
| **docker commit <ctn> <image:tag>** | **容器 → 镜像** |
| **docker logs <ctn>** | **输出容器日志** |
| **docker top <ctn>** | **输出容器进程信息** |
| **docker inspect <ctn>** | **输出容器元数据** |
| **docker port <ctn>** | **输出容器端口映射** |
| **docker cp <ctn:path> <path>** | **拷贝文件** |
| **卷** | **docker volume ls** | **查看卷列表** |
| **docker volume prune -a** | **清理未使用的卷** |
| **docker volume inspect <volume>** | **输出卷的元数据** |
| **远程** | **docker login -u <instinct323>** | **登录Docker Hub** |
| **docker push <instinct323/image:tag>** | **镜像 → 远程** |



**mysql：**

**windows服务启动：net {start | stop} mysql80**

**登陆账号：mysql -u <usr> -p**

**zjtong：20010323**

**存储路径：datadir**

**提交状态：show global status like 'Com%';**

**todo：存储引擎、索引、SQL优化、handler**

**ER图：矩形 (实体集)，椭圆 (实体特征，主键)，菱形 (引用 → 实体)，ISA三角 (子类 → 超类)**

|  |  |
| --- | --- |
| **通用：** | |
| **show <type>;** | **列出所有** |
| **show create <type> <name>;** | **查看创建语句** |
| **drop <type> <name>;** | **删除** |

|  |  |  |
| --- | --- | --- |
| **条件** | **is null** | **为空** |
| **>, >=, <, <=, =, != (<>)** | **大小比较** |
| **between <a> and <b>** | **范围** |
| **in <list>** |
| **any / all** | **批比较 (左连比较运算符，右连子查询)** |
| **and, or, not** | **逻辑** |
| **聚合** | **count(distinct \*)** | **数量** |
| **max / min / avg / sum / std / variance** | **数值运算** |
| **流程** | **if(x, t\_out, f\_out) / ifnull(x, n\_out)** | **条件选值** |
| **case <opt:x> when <v> then <r> ... else <v> end** |
| **字符串** | **concat** | **拼接** |
| **lower / upper** | **大小写转换** |
| **lpad / rpad(str, n, pad)** | **左/右填充** |
| **trim** | **除去首尾空格** |
| **substring(str, start, len)** | **切片** |
| **like <pat>** | **模糊匹配 ( \_ 单字符，% 多字符)** |
| **regexp <re>** | **正则匹配** |
| **数值** | **ceil / floor** | **上/下取整** |
| **round(x, decimal)** | **精度控制** |
| **rand** | **0~1随机数 (无参数)** |
| **sign / abs / sqrt** | **运算函数** |
| **exp(x) / pow(x, y) / log(x) / log(b, x)** | **指/对数函数** |
| **sin / cos / tan / asin / acos / atan** | **三角函数** |
| **bin / oct / hex** | **进制转换** |
| **时间** | **curdate / curtime / now** | **当前 (无参数)** |
| **year / month / day** | **获取指定信息** |
| **datediff(x, y)** | **天数减法** |
| **date\_add / date\_sub(x, interval <x> <unit>)** | **时间加减法** |

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| **变量variable (删除时设为NULL)：** | |
| **@@<key>** | **返回系统变量** |
| **@<key>** | **返回用户变量 (调用时创建)** |
| **set global <key> = <value>;** | **修改全局变量** |
| **set session <key> = <value>;** | **修改会话变量** |
| **set @<key> = <value>;** | **修改用户变量** |

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| **扼要profile：** | | |
| **变量** | **profiling** | **开关** |
| **profiling\_history\_size** | **历史记录长度** |

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| **delimiter <string>** | | | **修改语句结束符** |
| **declare <lvar> <type> default <value>;** | | | **声明局部变量** |
| **游标**  **cursor** | **declare <cur> cursor for select ...;** | | **声明游标** |
| **open <cur>; / close <cur>; / deallocate <cur>;** | | **打开 / 关闭游标** |
| **fetch <cur> into <var>;** | | **逐行获取数据** |
| **条件逻辑** | **if <cond> then**  **...**  **elseif <cond> then**  **...**  **else**  **...**  **end if;** | **case <var:optional>**  **when <value/cond> then**  **...**  **else**  **...**  **end case;** | **repeat**  **...**  **until <cond>**  **end repeat;** |
| **while <cond> do**  **...**  **end while;** | **<label>: loop**  **leave <label>; # break**  **iterate <label>; # continue**  **end loop <label>;** |  |
| **存储过程**  **procedure** | **create procedure <Func>( {in | out | inout} <arg> <type>)**  **begin**  **...**  **end;** | | **定义存储过程** |
| **call <Func>(args, );** | | **使用存储过程** |
| **存储函数**  **function** | **create function <Func>(<arg> <type>)**  **returns <type> <character>**  **begin**  **...**  **return <value>;**  **end;** | | **定义存储函数** |
| **character** | **deterministic** | **同输入同输出** |
| **no sql** | **无SQL语句** |
| **reads sql data** | **只读数据** |
| **触发器**  **trigger** | **create trigger <Func>**  **{before | after} {insert | update | delete} on <tb>**  **for each row**  **begin**  **... # new新增、修改后的数据；old删除、修改前的数据**  **end;** | | **定义触发器 (逐行)** |

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| **视图view：** | |
| **create or replace view <view> as select ...;** | **创建/替换视图** |
| **alter view <view> as select ...;** | **重建视图** |

**DDL定义：**

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| --- | --- |
| **数据类型：** | |
| **tinyint (1B) / smallint (2B) / mediumint (3B) / int (4B) / bigint (8B)** | **整数** |
| **float (4B) / double (8B) / decimal(MaxL, Decimal)** | **浮点数** |
| **char(MaxL) / varchar(MaxL) / enum(<str>...) / set(<str>...)**  **tinytext / text / mediumtext / longtext** | **字符串** |
| **tinyblob / blob / mediumblob / longblob** | **二进制** |
| **year / time / date / timestamp / datetime** | **日期 (timestamp有时间限制)** |

|  |  |
| --- | --- |
| **数据库database：** | |
| **create database <db> charset utf8;** | **创建数据库** |
| **use <db>;** | **使用数据库** |
| **select database();** | **显示选中的数据库** |

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| **数据表table：** | |
| **desc <tb>;** | **查看结构** |
| **truncate table <tb>;** | **重建数据表 (空表)** |
| **create table <tb>**  **(**  **<key> int auto\_increment, # 自增 (需为主键)**  **<key> <type> comment <str>, # 说明**  **<key> <type> not null, # 非空**  **<key> <type> unique, # 无重复 (可空)**  **<key> <type> default <value>, # 默认值**  **<key> <type> check <rule>, # 检查是否满足约束**  **constraint <id> <rule>, # 设置约束**  **)**  **engine = InnoDB # 存储引擎**  **charset = utf8 # 字符编码**  **data directory = 'D:/data' # 数据存储目录**  **index directory = 'D:/index' # 索引存储目录** | **创建数据表** |
| **create temporary table <tb> as select ...;** | **创建临时表 (1个query只引用1次)** |

|  |  |
| --- | --- |
| **数据表修改：** | |
| **alter table <old\_tb> rename to <new\_tb>;** | **重命名数据表** |
| **alter table <tb> <attr> <value>;** | **修改属性** |
| **alter table <tb> add/modify <key> <type>;** | **添加/修改键** |
| **alter table <tb> drop <key>;** | **删除键** |
| **alter table <tb> change <old\_key> <new\_key> <type>;** | **修改键** |
| **alter table <tb> add constraint <id> <rule>;** | **添加约束** |

|  |  |  |  |
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| **数据表约束：** | | | |
| **primary key (<key>)** | **主键 (非空，无重复)，长度越小越好** | | |
| **foreign key (<key>) references <tb> (<key>)**  **on update <act> on delete <act>** | **外键** | **restrict** | **默认** |
| **cascade** | **连带更新** |

**DML操作：**

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| --- | --- |
| **数据：** | |
| **insert into <tb> (<key>...) values (<value>...) , ...;** | **插入数据 (键可省略，主键顺序插入)** |
| **update <tb> set <key>=<value>... where <cond>;** | **修改数据** |
| **delete from <tb> where <cond>;** | **删除数据** |

|  |  |
| --- | --- |
| **载入：** | |
| **set local\_infile = 1;** | **开启文件载入** |
| **load data local infile <.csv> into <tb>**  **fields terminated by ',' lines terminated by '\n';** | **插入数据** |

|  |  |
| --- | --- |
| **事务：** | |
| **set autocommit = {0 | 1};** | **设置自动提交** |
| **start transaction; / end transaction;** | **开启 / 结束事务** |
| **set transaction isolation level <level>** | **设置事务隔离级别** |
| **savepoint <spt>;** | **创建保存点** |
| **rollback; / rollback to <spt>;** | **回滚事务 / 保存点** |
| **commit;** | **提交事务** |

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| **事务隔离级别** | **脏读**  **(另一个事务回滚)** | **不可重复读**  **(数据变化)** | **幻读**  **(数据行数变化)** |
| **read uncommitted** | **1** | **1** | **1** |
| **read committed** |  | **1** | **1** |
| **repeatable read (default)** |  |  | **1** |
| **serializable** |  |  |  |

**DQL查询：**

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| --- | --- | --- |
| **查询 (简单、嵌套、连接)：** | | |
| **explain**  **select distinct <key> <newk>...**  **into @<var>**  **from <tb> <newtb>**  **where <cond>**  **group by <key>**  **having <cond>**  **order by <key> asc, <key> desc**  **limit <start> <step>;** | **0** | **性能测试** |
| **4** | **选择字段，并去重，存入用户变量** |
| **1** | **选择数据表** |
| **2** | **数据过滤、等值连接** |
| **3** | **指定分组字段** |
| **分组后过滤** |
| **5** | **排序** |
| **6** | **分页** |

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| **表连接：** | |
| **<tb1> join <tb2> on <cond>** | **内连接 (只含交集)** |
| **<tb1> left/right join <tb2> on <cond>** | **外连接 (主表匹配，右连以右表为主)** |

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| **联合：** | |
| **union** | **结果合并** |
| **union all** | **结果合并 (去重)** |

**DCL控制：**

**<user> = root@localhost**

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| --- | --- |
| **用户user：** | |
| **select \* from mysql.user;** | **查询用户** |
| **create user <user> identified by <pwd>;** | **创建用户** |
| **alter user <user> identified by <pwd>;** | **修改密码** |

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| **权限grant：** | |
| **show grants for <user>;** | **查询权限** |
| **grant <all> on <db>.<tb> to <user>;** | **授予权限** |
| **revoke <all> on <db>.<tb> from <user>;** | **撤销权限** |