

IsfMonitor 用户手册

Product Name : IsfMonitor

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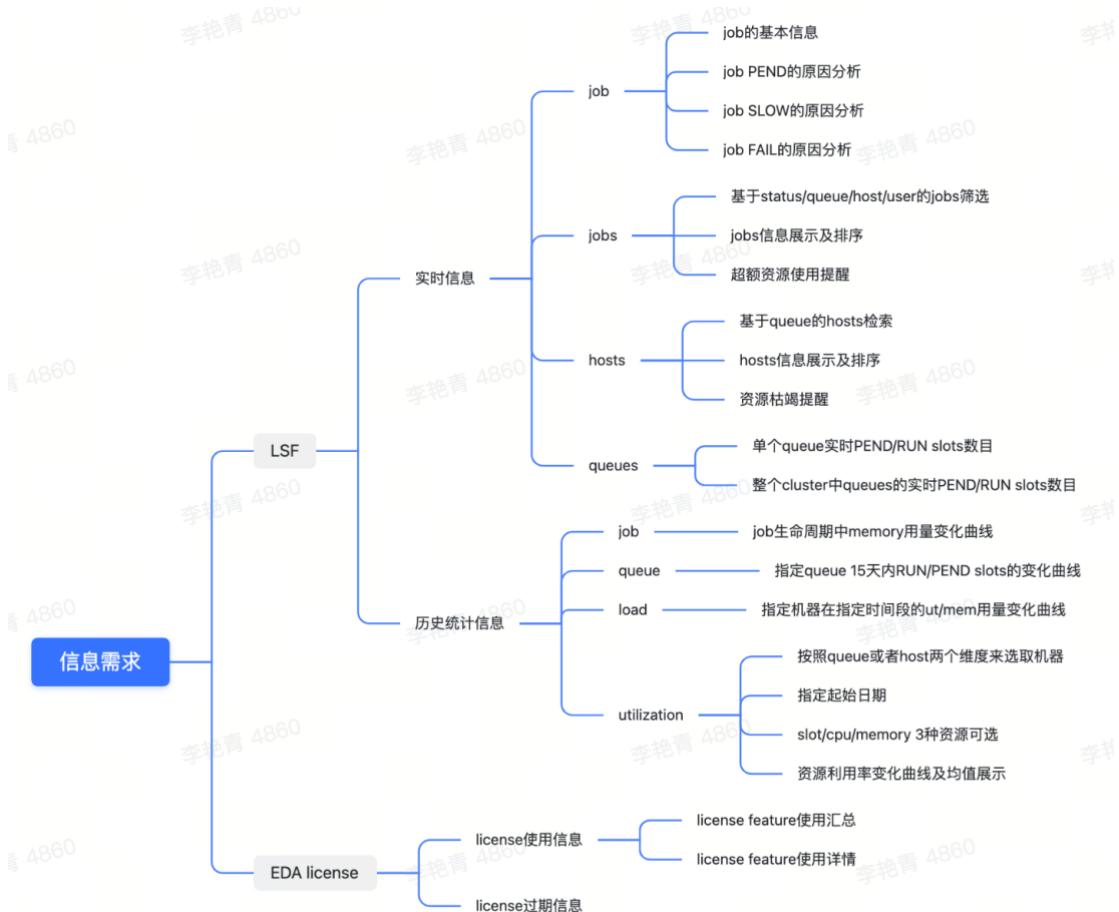
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一、简介

lsmMonitor 是一款用于 LSF/openlava 数据收集、分析及展示的开源工具，亦可用于 EDA license 实时信息检索，可以满足集成电路设计用户对于 LSF/license 的绝大部分信息查询和常规问题解决需求。

在集成电路设计 Linux 环境中，关于 LSF 集群和 EDA license 使用状况，用户常常会面临如下信息需求：



lsmMonitor 就是为如上信息需求提供一站式解决方案。

二、环境依赖

2.1 操作系统依赖

lsfMonitor 的开发和测试操作系统为 **CentOS Linux release 7.9.2009 (Core)**, 这也是 IC 设计常用的操作系统版本之一。

centos6/centos7/centos8, 及对应的 redhat 版本应该都可以运行, 主要的潜在风险在于系统库版本差异可能会影响部分组件的运行。

建议在 centos7.9 操作系统下使用。

2.2 python 版本依赖

lsfMonitor 基于 python 开发, 其开发和测试的 python 版本为 **python3.8.8**, 推荐使用 **Anaconda3-2021.05** 以解决库依赖问题。

不同版本的 python 可能会有 python 库版本问题, 按照系统要求安装对应版本的 python 库即可解决。

2.3 集群管理工具

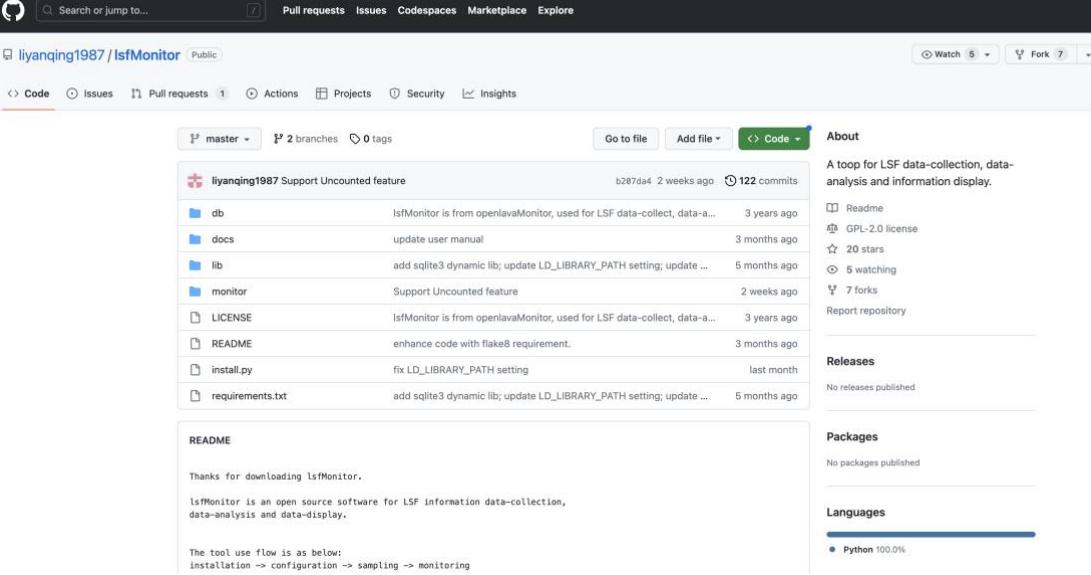
lsfMonitor 依赖 LSF/Openlava 集群管理系统, 暂不支持其它集群管理系统。

LSF 9.*/10.*的版本支持较好, Openlava 几个版本间 output message 有一定差异, 并不是所有版本都能够很好支持。

三、工具安装及配置

3.1 工具下载

lsfMonitor 的 github 路径位于 <https://github.com/liyanqing1987/lsfMonitor>。



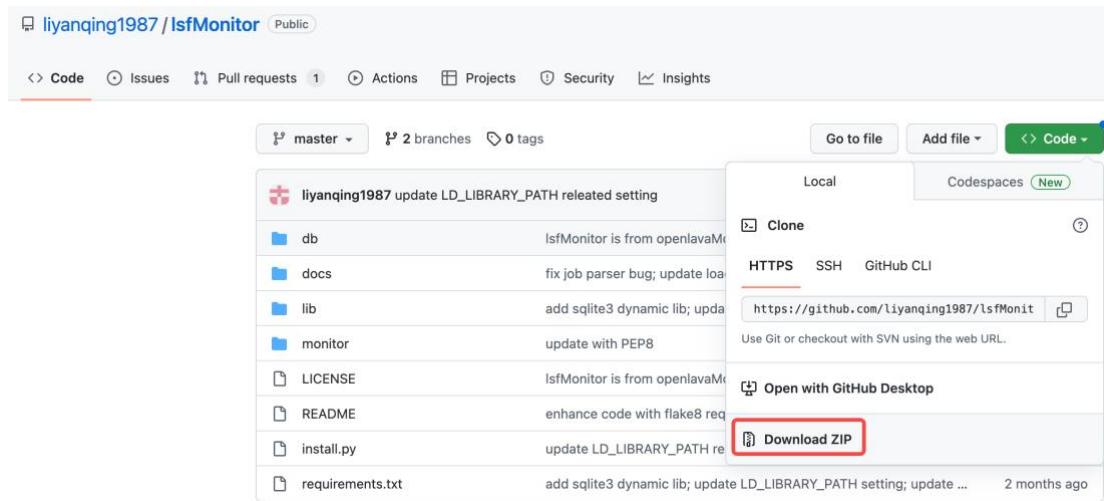
The screenshot shows the GitHub repository page for 'liyanqing1987 / lsfMonitor'. The repository has 5 forks and 7 forks. It contains 122 commits, 2 branches, and 0 tags. The code tab is selected, showing files like db, docs, lib, monitor, LICENSE, README, install.py, and requirements.txt. The README file contains instructions for downloading, installing, and configuring the tool. The repository is described as a tool for LSF data-collection, data-analysis, and information display. It uses Python 100.0%.

可以采用“`git clone https://github.com/liyanqing1987/lsfMonitor.git`”的方式拉取源代码。

Bash

```
[liyanqing@cmp1 test]$ git clone  
https://github.com/liyanqing1987/lsfMonitor.git  
Cloning into 'lsfMonitor'...  
remote: Enumerating objects: 709, done.  
remote: Counting objects: 100% (281/281), done.  
remote: Compressing objects: 100% (171/171), done.  
remote: Total 709 (delta 177), reused 208 (delta 109), pack-reused 428  
Receiving objects: 100% (709/709), 908.67 KiB | 594.00 KiB/s,  
done.  
Resolving deltas: 100% (442/442), done.
```

也可以在 lsfMonitor 的 github 页面上, Code -> Download ZIP 的方式拉取代码包。



如果国内的用户不方便访问 github，也可以通过
https://gitee.com/liyanqing1987/ic_flow_platform 获取 lsfMonitor 的源代码。

3.2 工具安装

工具安装之前，首先参照第二章“环境依赖”满足 lsfMonitor 的环境依赖关系。

安装包下的文件和目录如下。

```
Bash
[liyanqing.1987@n212-206-207 tools]$ cd lsfMonitor/
[liyanqing.1987@n212-206-207 lsfMonitor]$ ls
db  docs  install.py  lib  LICENSE  monitor  README
requirements.txt
```

确认 python 版本正确，并基于安装包中的 requirements.txt 安装 python 依赖库。

```
Bash
[root@ic-admin1 licenseMonitor]# pip3 install -r requirements.txt
Looking in indexes: https://bytedpypi/byted.org/simple/
Requirement already satisfied: pexpect==4.8.0 in
/ic/software/tools/python3/3.8.8/lib/python3.8/site-packages (from
-r requirements.txt (line 1)) (4.8.0)
Requirement already satisfied: ptyprocess>=0.5 in
/ic/software/tools/python3/3.8.8/lib/python3.8/site-packages (from
pexpect==4.8.0->-r requirements.txt (line 1)) (0.7.0)
```

在安装目录下，使用命令“python3 install.py”安装 lsfMonitor。

```
Bash
[root@ic-admin1 lsfMonitor]# python3 install.py
>>> Check python version.
    Required python version : (3, 5)
    Current  python version : (3, 8)

>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bmonitor"
.
>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bsample".
>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/check_i
ssue_reason".
>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/patch".
>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/process
_tracer".
>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/seedb".
>>> Generate script
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/show_li
cense_feature_usage".
>>> Generate config file
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/conf/config.p
y".

Done, Please enjoy it.
```

3.3 工具配置

安装目录下主要的配置文件为 monitor/conf/config.py，用于配置工具的一些基本设置和验证规则。

安装后默认配置如下，一般需要重新配置。

```
Bash
# Specify the database directory.
```

```
db_path = "/ic/data/usr/liyanqing.1987/tools/lsfMonitor/db"

# Specify lmstat path, example
"/eda/synopsys/scl/2021.03/linux64/bin/lmstat".
lmstat_path = ""

# Specify lmstat bsub command, example "bsub -q normal -Is".
lmstat_bsub_command = ""
```

db_path: lsfMonitor 需要保存部分 LSF 数据，保存为 sqlite 类型的文本数据库，db_path 用于指定数据库的顶层路径。

lmstat_path: lsfMonitor 通过工具 lmstat 获取 EDA license 信息，此处用于配置 lmstat 工具的路径。

lmstat_bsub_command: lsfMonitor 一般在 Linux 环境的 login server 上运行，而 login server 一般会通过 iptables 设置禁止 lmstat 等 EDA 相关的工具运行，所以执行 lmstat 的时候需要 bsub 出去，此处用于指定执行 lmstat 时候的 bsub 命令。

一个使用的 demo 配置如下。

```
Bash
# Specify the database directory.
db_path = "/ic/software/cad_data/it/lsfMonitor/db"

# Specify lmstat path, example
"/eda/synopsys/scl/2021.03/linux64/bin/lmstat".
lmstat_path =
"/ic/software/synopsys/scl/2021.03/linux64/bin/lmstat"

# Specify lmstat bsub command, example "bsub -q normal -Is".
lmstat_bsub_command = "bsub -q normal -Is"
```

四、工具使用

lsmMonitor 工具包括“数据采集”和“数据展示”两大部分，对应的执行脚本分别为 bsample 和 bmonitor，均位于 lsmMonitor 安装路径下的 monitor/bin 子目录中。

4.1 数据采集 bsample

4.1.1 帮助信息

bsample 用于采集 LSF/openlava 的 job/queue/host/load/user/utilization 信息。

```
Bash
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/bin/bsample -h
usage: bsample.py [-h] [-j] [-q] [-H] [-l] [-u] [-U]

optional arguments:
  -h, --help            show this help message and exit
  -j, --job              Sample running job info with command "bjobs -u all -r -UF".
  -q, --queue            Sample queue info with command "bqueues".
  -H, --host             Sample host info with command "bhosts".
  -l, --load              Sample host load (ut/tmp/swp/mem) info with
command "lsload".
  -u, --user              Sample user info with command "busers".
  -U, --utilization      Sample utilization (slot/cpu/mem) info with
command "lsload/bhosts/lshosts".
```

--help: 打印帮助信息。

--job: 采集 job 信息并存储。

--queue: 采集 queue 信息并存储。

--host: 采集 host 信息并存储。 (bmonitor 暂时不需要)

--load: 采集 host load 信息并存储。

--user: 采集 user 信息并存储。 (bmonitor 暂时不需要)

--utilization: 采集 slot/cpu/memory 的 utilization 信息。

4.1.2 采样示例

我们推荐用 crontab 来定时采样（Jenkins 类似），推荐采样间隔为 5 分钟。下面是一个示例。（crontab -e）

```
Bash
SHELL=/bin/bash
PATH=/ic/software/tools/anaconda/Anaconda3-
2021.05/bin:/ic/software/cad_tools/bin:/usr/local/bin:/bin:/usr/bi
n:/usr/local/sbin:/usr/sbin:/ic/software/tools/lsf/10.1/linux3.10-
glibc2.17-x86_64/bin
LSF_SERVERDIR=/ic/software/tools/lsf/10.1/linux3.10-glibc2.17-
x86_64/etc
LSF_LIBDIR=/ic/software/tools/lsf/10.1/linux3.10-glibc2.17-
x86_64/lib
LSF_BINDIR=/ic/software/tools/lsf/10.1/linux3.10-glibc2.17-
x86_64/bin
LSF_ENVDIR=/ic/software/tools/lsf/conf
LSF_TOP=/ic/software/tools/lsf

# For lsfMonitor
*/5 * * * *
/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bsample -j
*/5 * * * *
/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bsample -q
*/5 * * * *
/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bsample -l
*/5 * * * *
/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bsample -U
```

4.1.3 数据库

bsample 生成的数据库如下。

```
TypeScript
[liyanqing.1987@n212-206-207 monitor]$ ls
job  load.db  queue.db  utilization_day.db  utilization.db
[liyanqing.1987@n212-206-207 monitor]$
[liyanqing.1987@n212-206-207 monitor]$ ls job/
0_9999.db      180000_189999.db  270000_279999.db
360000_369999.db 450000_459999.db  540000_549999.db
630000_639999.db 720000_729999.db  810000_819999.db
```

```
90000_99999.db  
100000_109999.db 190000_199999.db 280000_289999.db  
370000_379999.db 460000_469999.db 550000_559999.db  
640000_649999.db 730000_739999.db 820000_829999.db  
910000_919999.db  
...
```

job/*.db: 记录 job 的 mem usage 信息, 由“bsample -j”生成。

load.db: 记录 host 的 load 信息, 由“bsample -l”生成。

queue.db: 记录 queue 的 run/pending slot 信息, 由“bsample -q”生成。

utilization_day.db / utilization.db: 记录 slot/cpu/mem 的 utilization 信息, 由“bsample -U”生成。

如果要查看数据库中的内容, 可以使用#5.1 中的工具 seedb。

特别注意:

V1.3 版本开始, bsample 采样数据库的数据格式有变化, 跟之前版本 bsample 生成的数据库不兼容, 所以只能清理数据库后重新安装使用, 不能复用旧的数据库。

4.2 数据展示 bmonitor

4.2.1 工具载入

lsfMonitor 的核心工具叫做 **bmonitor**, 是一个图形界面工具, 其载入方式有多种。

- 直接引用 bmonitor 绝对路径。
- 采用 modules 管理和加载环境, 引用 bmonitor 脚本名即可。
- 将 bmonitor 连接到 LSF 的 bsub 脚本路径中, 引用 bmonitor 脚本名即可。

推荐第三种方式, 下面是具体效果。

Bash

```
[liyanqing.1987@n212-206-207 ~]$ which bmonitor  
/ic/software/tools/lsf/10.1/linux2.6-glibc2.3-x86_64/bin/bmonitor
```

4.2.2 帮助信息

直接执行 bmonitor 会启动图形界面。

执行“bmonitor -h”则可以查看 bmonitor 的帮助信息。

bmonitor 的参数主要用于初始化部分信息，不过这些参数都可以在 bmonitor 启动后设置。

```
Bash
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/bin/monitor -h
usage: bmonitor.py [-h] [-j JOBID] [-u USER] [-f FEATURE] [-t
{JOB,JOBS,HOSTS,QUEUES,LOAD,UTILIZATION,LICENSE}] [-dl]

optional arguments:
-h, --help            show this help message and exit
-j JOBID, --jobid JOBID
                      Specify the jobid which show it's
information on "JOB" tab.
-u USER, --user USER  Specify the user show how's job
information on "JOBS" tab.
-f FEATURE, --feature FEATURE
                      Specify license feature which you want to
see on "LICENSE" tab.
-t {JOB,JOBS,HOSTS,QUEUES,LOAD,UTILIZATION,LICENSE}, --tab
{JOB,JOBS,HOSTS,QUEUES,LOAD,UTILIZATION,LICENSE}
                      Specify current tab, default is "JOBS"
tab.
-dl, --disable_license
                      Disable license check function.
```

--help: 打印帮助信息。

--jobid: 指定 jobid，用于切换到 JOB 页并直接显示指定 jobid 的信息。

--user: 指定 user，用于切换到 JOBS 页并显示指定用户的所有 job 信息。

--feature: 指定 license feature，用于切换到 LICENSE 页并显示指定 license feature 的信息。

--tab {JOB, JOBS, HOSTS, QUEUES, LOAD, UTILIZATION, LICENSE}: 指定页面，会将 bmonitor 打开到指定 GUI 页面。

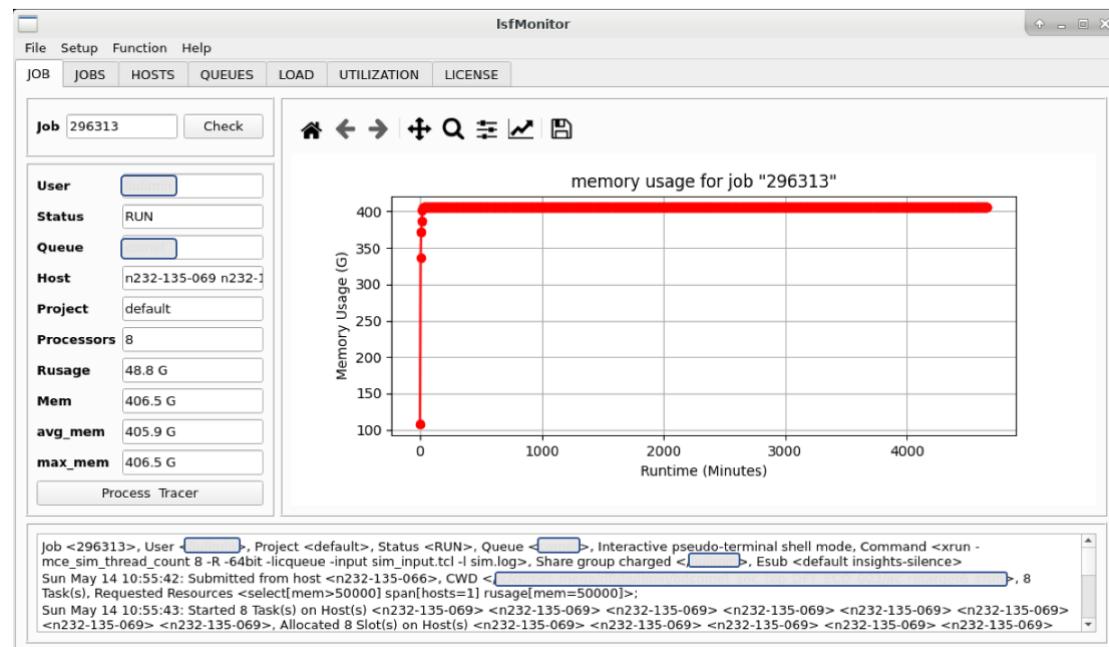
--disable_license: 启动的时候不执行 license 信息获取步骤，以加快 GUI 打开速度。

4.2.3 JOB 页

lsmMonitor 的 JOB 页，主要用于查看指定 job 的详细信息，以及 job 内存用量的历史曲线。

4.2.3.1 获取 job 详细信息和内存用量曲线

在 Job 框输入 jobid，点击 Check 按钮，可以查看指定 job 的详细信息（来源于 bjob -UF <JOBID>）和 job 的内存用量曲线。



通过 job 的详细信息，可以帮助用户 debug 如下常见问题。

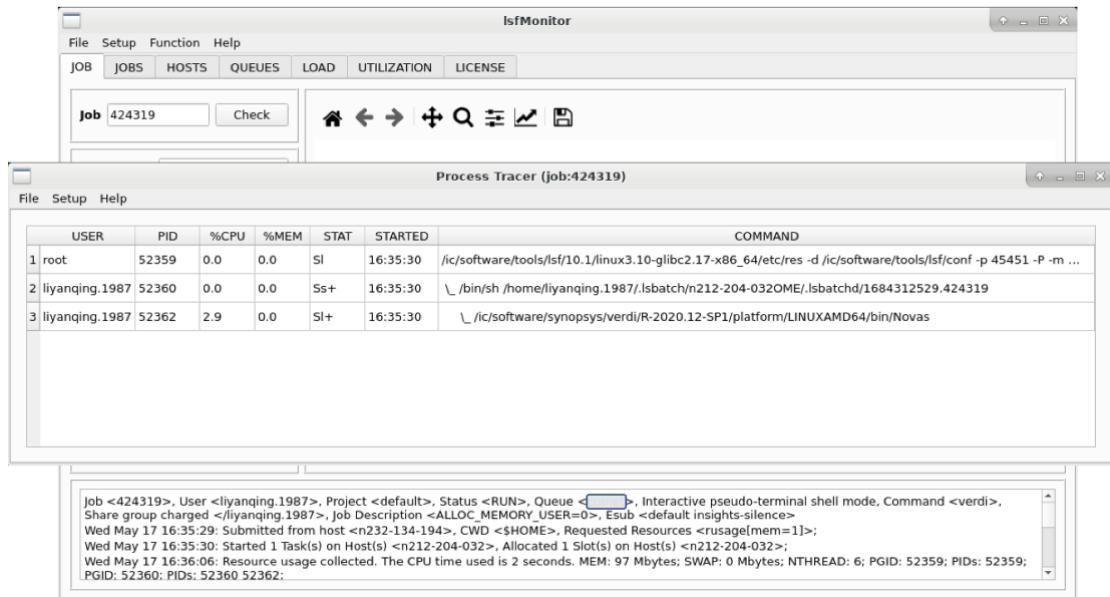
job PEND 原因：如果 job 是 PEND 状态，可以从详细信息中的"PENDIG REASONS:"看到 job PEND 的原因。

job FAIL 原因：如果 job 是 EXIT 状态，可以从退出码判断 job 异常退出是系统原因还是工具原因（退出码小于 128 为工具原因，大于 128 为系统原因）。

job SLOW 原因：如果 job 运行缓慢，可以通过进程追踪的方式判断 job 卡在哪。

4.2.3.2 追踪 job 进程 (trace job slow issue)

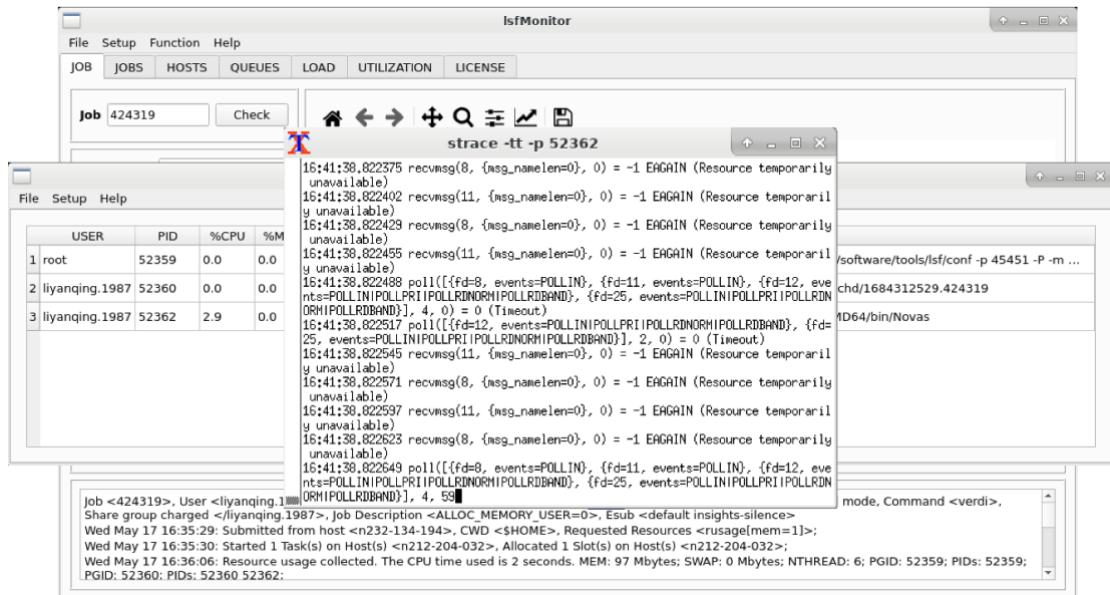
如果感觉 job 运行过于缓慢，可以点击 JOB 页的“Process Tracer”按钮追踪 job 的进程状态。



此时是以进程树的方式展现 job 相关的所有进程，其中核心进程是下面 EDA 工具的进程。

如果核心进程是 R (run) 的状态，那么状态时正常的。

如果所有进程都是 S (sleep) 的状态，那么任务可能遇到异常，可以点击 process_tracer 工具的 PID 列对应的 pid 查看相应进程的工作状态。比如此时点击“PID”列的最后一项 52362，可以看到这个 Novas 进程的系统交互细节。



进程的系统交互情况可以帮助用户判断 job 运行缓慢的原因，绝大多数情况下，EDA 工具运行极端缓慢都是由于工具本身问题导致的。

4.2.4 JOBS 页

lsmMonitor 的 JOBS 页，主要用于批量查看 jobs 的信息。

Job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)	Command
1 62859	lsmMonitor	RUN	long	n212-206-227	2022-12-21 14:32:27		1	0		/ic/software/...
2 62865	lsmMonitor	RUN	long	n212-206-227	2022-12-21 14:32:52		1	6.9		/ic/software/...
3 952165	lsmMonitor	RUN	long	n212-206-227	2023-06-02 14:27:09		1	2.1		export ...
4 41914	lsmMonitor	RUN	long	n212-206-227	2023-06-06 16:39:13		1	0.4		hspice ./test.sp
5 82324	lsmMonitor	RUN	long	n212-206-227	2023-06-07 17:45:51		4	0.4		gmake -f ./...
6 151366	lsmMonitor	RUN	long	n212-206-227	2023-06-09 16:19:40		4	1.2		indago -lwd ...
7 153547	lsmMonitor	RUN	long	n212-206-227	2023-06-09 17:42:37		4	68.4	3.9	make SEED=2 ...
8 154136	lsmMonitor	RUN	long	n212-206-227	2023-06-09 17:57:57		4	69.8		gmake -f ./...
9 176121	lsmMonitor	RUN	long	n212-206-227	2023-06-11 21:08:52		8	50	44.3	cerebrus/comm...
10 176122	lsmMonitor	RUN	long	n212-206-227	2023-06-11 21:08:52		8	50	37.5	cerebrus/comm...
11 662932	lsmMonitor	RUN	long	n212-204-040	2023-04-21 15:48:57		4	29.3	146.1	/...
12 662957	lsmMonitor	RUN	long	n212-204-040	2023-04-21 15:51:34		4	29.3	32.9	/...
13 812961	lsmMonitor	RUN	long	n212-204-040	2023-04-27 10:47:37		4	97.7	160.2	/...
14 742262	lsmMonitor	RUN	long	n232-133-010	2023-04-25 14:09:18		4	29.3	162.9	/...
15 81990	lsmMonitor	RUN	long	n232-133-010	2023-06-07 17:12:57		4	29.3	23.5	tesseract -shell -...

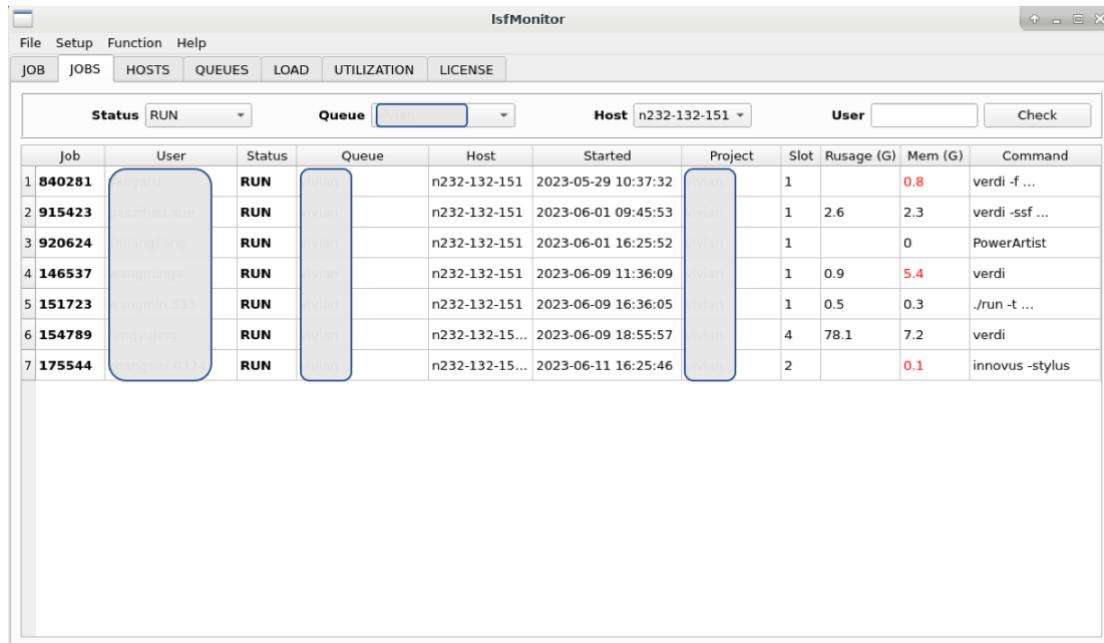
4.2.4.1 JOBS 页基本信息

默认 jobs 的信息来源于命令 bjobs -UF -r -u all，部分展示参数意义如下：

Host	Started	Processor	Slot	Rusage	Mem
job 执行的机器	job 开始 RUN 的时间	job 申请的 cpu 核数	job 申请的 slots	job 申请的 memory	job 实际使用的 memory

4.2.4.2 jobs 信息检索

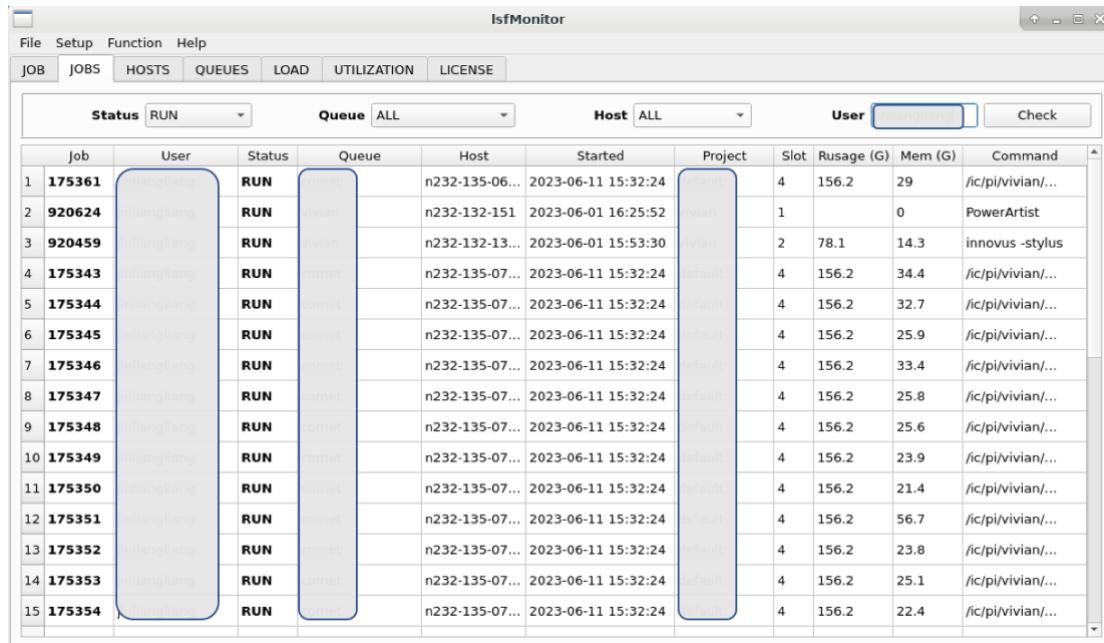
可以通过 Status/Queue/Host 下来菜单来筛选 job。



The screenshot shows the IsfMonitor application window. The menu bar includes File, Setup, Function, and Help. The top navigation bar has tabs for JOB, JOBS, HOSTS, QUEUES, LOAD, UTILIZATION, and LICENSE. The main area displays a table of jobs. The columns are: Job, User, Status, Queue, Host, Started, Project, Slot, Rusage (G), Mem (G), and Command. A filter bar at the top of the table allows setting Status (RUN), Queue (ALL), Host (n232-132-151), and User (empty). A 'Check' button is also present. The table lists 7 jobs, all in RUN status on host n232-132-151.

Job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)	Command
1 840281	verdi	RUN	ALL	n232-132-151	2023-05-29 10:37:32	default	1	0.8	0.8	verdi -f ...
2 915423	verdi	RUN	ALL	n232-132-151	2023-06-01 09:45:53	default	1	2.6	2.3	verdi -ssf ...
3 920624	jianglang	RUN	ALL	n232-132-151	2023-06-01 16:25:52	default	1	0	0	PowerArtist
4 146537	jiangming	RUN	ALL	n232-132-151	2023-06-09 11:36:09	default	1	0.9	5.4	verdi
5 151723	jiangmin.333	RUN	ALL	n232-132-151	2023-06-09 16:36:05	default	1	0.5	0.3	./run -t ...
6 154789	jiangyong	RUN	ALL	n232-132-15...	2023-06-09 18:55:57	default	4	78.1	7.2	verdi
7 175544	innovus.000	RUN	ALL	n232-132-15...	2023-06-11 16:25:46	default	2	0.1	0.1	innovus -stylus

也可以通过 User 输入框输入用户名，然后点击 Check 按钮来按照 user 筛选 job。



The screenshot shows the IsfMonitor application window. The menu bar includes File, Setup, Function, and Help. The top navigation bar has tabs for JOB, JOBS, HOSTS, QUEUES, LOAD, UTILIZATION, and LICENSE. The main area displays a table of jobs. The columns are: Job, User, Status, Queue, Host, Started, Project, Slot, Rusage (G), Mem (G), and Command. A filter bar at the top of the table allows setting Status (RUN), Queue (ALL), Host (ALL), and User (vivian). A 'Check' button is also present. The table lists 15 jobs, all in RUN status on host n232-135-07, belonging to user vivian.

Job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)	Command
1 175361	vivian	RUN	ALL	n232-135-06...	2023-06-11 15:32:24	default	4	156.2	29	/ic/pi/vivian/...
2 920624	vivian	RUN	ALL	n232-132-151	2023-06-01 16:25:52	default	1	0	0	PowerArtist
3 920459	jianglang	RUN	ALL	n232-132-13...	2023-06-01 15:53:30	default	2	78.1	14.3	innovus -stylus
4 175343	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	34.4	/ic/pi/vivian/...
5 175344	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	32.7	/ic/pi/vivian/...
6 175345	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	25.9	/ic/pi/vivian/...
7 175346	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	33.4	/ic/pi/vivian/...
8 175347	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	25.8	/ic/pi/vivian/...
9 175348	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	25.6	/ic/pi/vivian/...
10 175349	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	23.9	/ic/pi/vivian/...
11 175350	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	21.4	/ic/pi/vivian/...
12 175351	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	56.7	/ic/pi/vivian/...
13 175352	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	23.8	/ic/pi/vivian/...
14 175353	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	25.1	/ic/pi/vivian/...
15 175354	jianglang	RUN	ALL	n232-135-07...	2023-06-11 15:32:24	default	4	156.2	22.4	/ic/pi/vivian/...

4.2.4.3 JOBS 页特殊操作/显示

点击 Job 列的 jobid，可以直接跳转到 JOB 页，并展示选中 job 的信息。

The screenshot shows two windows of the IsfMonitor application.

Top Window (IsfMonitor JOBS page):

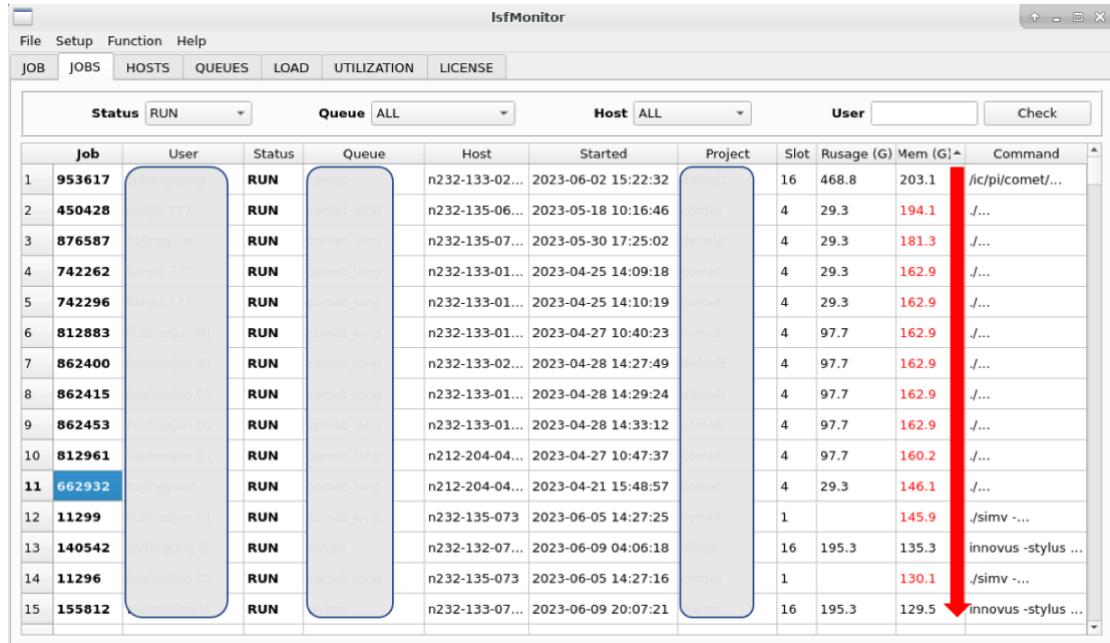
- Toolbar:** File, Setup, Function, Help.
- Menu Bar:** JOB, JOBS, HOSTS, QUEUES, LOAD, UTILIZATION, LICENSE.
- Filter Buttons:** Status (RUN), Queue (ALL), Host (ALL), User (empty), Check.
- Table:** A grid of job information. The first column is 'Job' (jobid), the second is 'User', the third is 'Status', the fourth is 'Queue', the fifth is 'Host', the sixth is 'Started', the seventh is 'Project', the eighth is 'Slot', the ninth is 'Rusage (G)', the tenth is 'Mem (G)', and the eleventh is 'Command'. Job 662932 is highlighted with a blue border.

Job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)	Command
1 62859	lengding_110	RUN	comet	n212-206-227	2022-12-21 14:32:27		1	0	/ic/software/...	
2 62865	lengding_110	RUN	comet	n212-206-227	2022-12-21 14:32:52		1	6.9	/ic/software/...	
3 952165	lengding_110	RUN	comet_long	n212-206-227	2023-06-02 14:27:09		1	2.1	export ...	
4 41914	lengding_110	RUN	comet	n212-206-227	2023-06-06 16:39:13		1	0.4	hspice ./test.sp	
5 82324	lengding_110	RUN	comet	n212-206-227	2023-06-07 17:45:51		4	0.4	gmake -f ./...	
6 151366	lengding_110	RUN	comet	n212-206-227	2023-06-09 16:19:40		4	1	1.2	indago -lwd ...
7 153547	lengding_110	RUN	comet	n212-206-227	2023-06-09 17:42:37		4	68.4	3.9	make SEED=2 ...
8 154136	lengding_0743	RUN	comet	n212-206-227	2023-06-09 17:57:57		4	69.8	3.9	gmake -f ./...
9 176121	lengding_110	RUN	comet	n212-206-227	2023-06-11 21:08:52		8	50	47.8	cerebrus/comm...
10 176122	lengding_110	RUN	comet	n212-206-227	2023-06-11 21:08:52		8	50	37.5	cerebrus/comm...
11 662932	lengding_110	RUN	comet_long	n212-204-046	2023-04-21 15:48:57	comet	4	29.3	146.1	./...
12 662957	lengding_110	RUN	comet_long	n212-204-046	2023-04-21 15:51:34	comet	4	29.3	32.9	./...
13 812961	lengding_01	RUN	comet_long	n212-204-046	2023-04-27 10:47:37	comet	4	97.7	160.2	./...
14 742262	lengding_110	RUN	comet_long	n232-133-01...	2023-04-25 14:09:18		4	29.3	162.9	./...
15 81990	lengding_110	RUN	comet	n232-133-01...	2023-06-07 17:12:57		4	29.3	23.5	tesseract -shell ...

Bottom Window (IsfMonitor Job details for 662932):

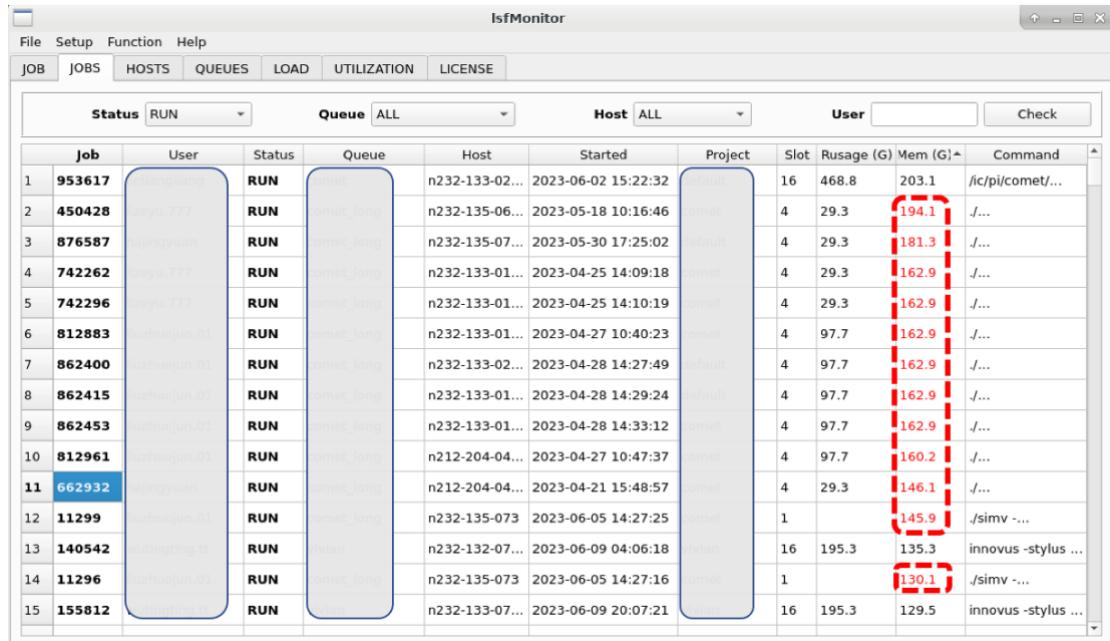
- Toolbar:** Home, Back, Forward, Refresh, Search, Stop, Stop All.
- Search:** Job (662932), Check.
- Details:** User, Status, Queue, Host, Project, Processors, Rusage, Mem, avg_mem, max_mem.
- Graph:** memory usage for job "662932". The Y-axis is Memory Usage (G) from 0 to 150. The X-axis is Runtime (Minutes) from 0 to 40000. A red line shows a steady upward trend from approximately 80G at 0 minutes to about 145G at 40000 minutes.
- Log:** Job <662932>, User <[REDACTED]>, Project <[REDACTED]>, Status <RUN>, Queue <[REDACTED]>, Interactive pseudo-terminal mode, Command <./run_post_sim_worst>, Share group charged <[REDACTED]>, Esub <default insights-silence>. Fri Apr 21 15:48:57: Submitted from host <n232-135-066>, CWD <[REDACTED]>, 4 Task(s), Requested Resources <spanhosts=1>rusage[mem=30000]; Fri Apr 21 15:48:57: Started 4 Task(s) on Host(s) <n212-204-046> <n212-204-046> <n212-204-046> <n212-204-046>, Allocated 4 Slot(s) on Host(s) <n212-204-046> <n212-204-046> <n212-204-046> <n212-204-046>;

Mem 列，点击标题，可以让 job 按照 memory 用量排序。(其它列同样具有排序功能)



Job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)▲	Command
1 953617	lengyuan	RUN	comet, long	n232-133-02...	2023-06-02 15:22:32	default	16	468.8	203.1	/ic/pi/comet/...
2 450428	lengyuan.777	RUN	comet, long	n232-135-06...	2023-05-18 10:16:46	default	4	29.3	194.1	./...
3 876587	lengyuan	RUN	comet, long	n232-135-07...	2023-05-30 17:25:02	default	4	29.3	181.3	./...
4 742262	lengyuan.777	RUN	comet, long	n232-133-01...	2023-04-25 14:09:18	default	4	29.3	162.9	./...
5 742296	lengyuan.777	RUN	comet, long	n232-133-01...	2023-04-25 14:10:19	default	4	29.3	162.9	./...
6 812883	lengyuan.01	RUN	comet, long	n232-133-01...	2023-04-27 10:40:23	default	4	97.7	162.9	./...
7 862400	lengyuan.01	RUN	comet, long	n232-133-02...	2023-04-28 14:27:49	default	4	97.7	162.9	./...
8 862415	lengyuan.01	RUN	comet, long	n232-133-01...	2023-04-28 14:29:24	default	4	97.7	162.9	./...
9 862453	lengyuan.01	RUN	comet, long	n232-133-01...	2023-04-28 14:33:12	default	4	97.7	162.9	./...
10 812961	lengyuan.01	RUN	comet, long	n212-204-04...	2023-04-27 10:47:37	default	4	97.7	160.2	./...
11 662932	lengyuan.01	RUN	comet, long	n212-204-04...	2023-04-21 15:48:57	default	4	29.3	146.1	./...
12 11299	lengyuan.01	RUN	comet, long	n232-135-073	2023-06-05 14:27:25	default	1		145.9	./simv -...
13 140542	lengyuan.01	RUN	comet, long	n232-132-07...	2023-06-09 04:06:18	innovus	16	195.3	135.3	innovus -stylus ...
14 11296	lengyuan.01	RUN	comet, long	n232-135-073	2023-06-05 14:27:16	default	1		130.1	./simv -...
15 155812	lengyuan	RUN	comet, long	n232-133-07...	2023-06-09 20:07:21	default	16	195.3	129.5	innovus -stylus ...

如果 Rusage (job 的内存申请量) 没有设, 或者 Rusage 小于 Mem (job 的实际内存用量) 的值, Mem 值会显示红色, 对应的 job 设置都是不规范的, 需要修正。



Job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)▲	Command
1 953617	lengyuan	RUN	comet, long	n232-133-02...	2023-06-02 15:22:32	default	16	468.8	203.1	/ic/pi/comet/...
2 450428	lengyuan.777	RUN	comet, long	n232-135-06...	2023-05-18 10:16:46	default	4	29.3	194.1	./...
3 876587	lengyuan	RUN	comet, long	n232-135-07...	2023-05-30 17:25:02	default	4	29.3	181.3	./...
4 742262	lengyuan.777	RUN	comet, long	n232-133-01...	2023-04-25 14:09:18	default	4	29.3	162.9	./...
5 742296	lengyuan.777	RUN	comet, long	n232-133-01...	2023-04-25 14:10:19	default	4	29.3	162.9	./...
6 812883	lengyuan.01	RUN	comet, long	n232-133-01...	2023-04-27 10:40:23	default	4	97.7	162.9	./...
7 862400	lengyuan.01	RUN	comet, long	n232-133-02...	2023-04-28 14:27:49	default	4	97.7	162.9	./...
8 862415	lengyuan.01	RUN	comet, long	n232-133-01...	2023-04-28 14:29:24	default	4	97.7	162.9	./...
9 862453	lengyuan.01	RUN	comet, long	n232-133-01...	2023-04-28 14:33:12	default	4	97.7	162.9	./...
10 812961	lengyuan.01	RUN	comet, long	n212-204-04...	2023-04-27 10:47:37	default	4	97.7	160.2	./...
11 662932	lengyuan.01	RUN	comet, long	n212-204-04...	2023-04-21 15:48:57	default	4	29.3	146.1	./...
12 11299	lengyuan.01	RUN	comet, long	n232-135-073	2023-06-05 14:27:25	default	1		145.9	./simv -...
13 140542	lengyuan.01	RUN	comet, long	n232-132-07...	2023-06-09 04:06:18	innovus	16	195.3	135.3	innovus -stylus ...
14 11296	lengyuan.01	RUN	comet, long	n232-135-073	2023-06-05 14:27:16	default	1		130.1	./simv -...
15 155812	lengyuan	RUN	comet, long	n232-133-07...	2023-06-09 20:07:21	default	16	195.3	129.5	innovus -stylus ...

如果 Status 列内容为 PEND，点击 PEND 单元格，bmonitor 会调用工具“Check Issue Reason”来查看 job PEND 的原因。

Job ID	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)	Command
148570	comet	PSUSP				default	12	390.6		/ic/pi/comet/...
148560	comet	PSUSP								/ic/pi/comet/...
148561	comet	PSUSP								/ic/pi/comet/...
148562	comet	PSUSP								/ic/pi/comet/...
148563	comet	PSUSP								/ic/pi/comet/...
148568	comet	PSUSP								/ic/pi/comet/...
148569	comet	PSUSP								/ic/pi/comet/...
181933	vivian	PE								/run -t ...
181934	vivian	PE								/run -t ...
181935	vivian	PE								/run -t ...
181936	vivian	PE								/run -t ...
181937	vivian	PE								/run -t ...
181938	vivian	PEND	comet_regression				1	19.5		/run -t ...
181939	vivian	PEND	comet_regression				1	19.5		/run -t ...
181940	vivian	PEND	comet_regression				1	19.5		/run -t ...

4.2.5 HOSTS 页

lsfMonitor 的 JOBS 页，主要用于查看所有 hosts 的信息。

Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
ic-hpc-mon02	ok		4	0	9	31	21	9	9	200
ic-lsfmaster1	ok		8	0	10	15	10	7	7	20
ic-lsfmaster2	ok		8	0	2	62	40	7	7	8
ic-lsfslave1	ok		8	0	3	62	33	7	7	23
n212-204-015	closed_Adm	comet_vivian	64	0	0	1945	1945	127	127	1608
n212-204-021	closed_Adm	normal_adamada?	64	8	0	1945	1740	127	116	1608
n212-204-042	closed_Adm	comet_comet_long	64	0	0	1945	1945	127	127	1608
n212-204-045	closed_Adm	comet_comet_long	64	8	3	1945	1740	127	126	1608
n212-204-046	closed_Adm	comet_comet_long	64	4	14	1945	1843	127	125	1608
n212-204-131	ok	dpu	32	2	0	376	317	255	254	3460
n212-204-132	ok	dpu	32	0	0	376	359	255	255	3460
n212-204-133	ok	dpu	32	0	0	376	359	255	255	3460
n212-204-134	ok	dpu	32	0	0	376	359	255	255	3460
n212-204-135	ok	dpu	32	0	0	376	359	255	255	3460
n212-204-136	ok	dpu	32	0	0	376	360	255	254	3460

4.2.5.1 HOSTS 页基本信息

默认 hosts 的信息来源于命令 bhosts (host 的 job 信息)、lshosts (host 的静态资源信息) 和 lsload (host 的动态资源信息)，部分展示参数意义如下：

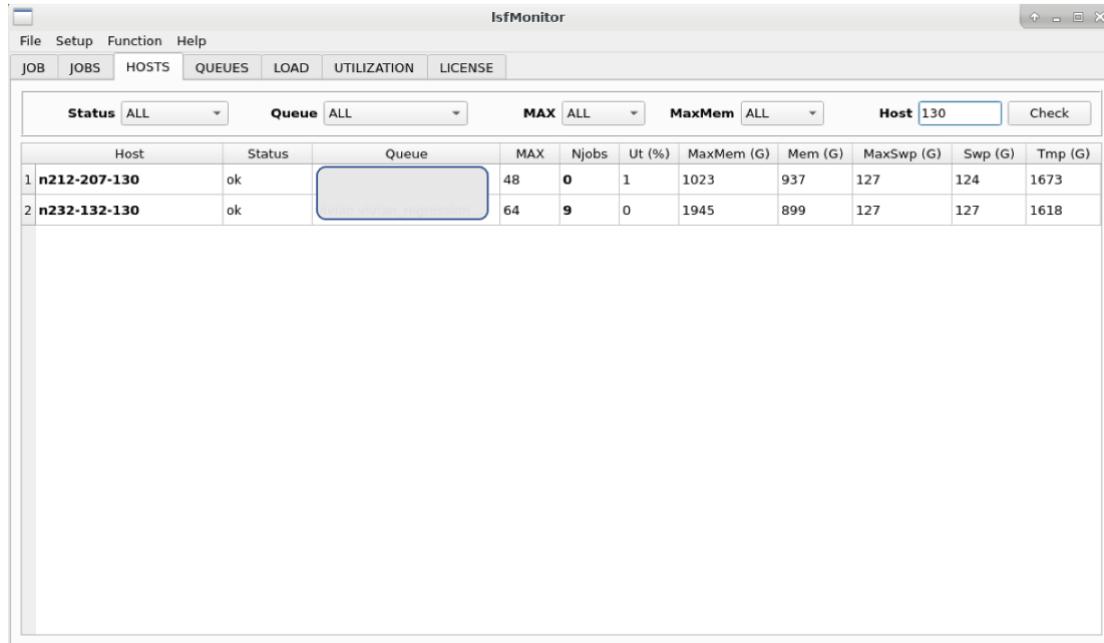
Queue	Ncpus	MAX	Njobs	Ut	Maxmem	Mem	Tmp
host 所属的队列	host 的 cpu 物理核数	host 接收 job 的最大数目	host 上 job 的数目	host 的 cpu 使用率	host 的内存大小	host 的内存可用量	host 的 /tmp 空间可用量

4.2.5.2 hosts 信息检索

可以通过 Status/Queue/MAX/MaxMem 下来菜单来筛选 host。

Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
1 n212-206-199	ok	normal[jv1.bw.on]	48	33	1	1007	736	127	126	1660
2 n212-206-200	ok	normal[jv1.bw.on]	48	36	23	1007	781	127	127	1538
3 n212-206-201	ok	normal[jv1.bw.on]	48	34	32	1007	780	127	127	1546
4 n212-206-202	ok	normal[jv1.bw.on]	48	46	64	1007	463	127	127	1625
5 n212-206-208	ok	normal[jv1.bw.on]	48	40	23	1007	709	127	127	1722
6 n212-206-209	ok	normal[jv1.bw.on]	48	32	6	1007	783	131	129	1721
7 n212-206-219	ok	normal[jv1.bw.on]	48	36	54	1007	636	127	127	1608
8 n212-206-220	ok	normal[jv1.bw.on]	48	43	16	1007	644	127	125	1606
9 n212-206-224	ok	normal[jv1.bw.on]	48	31	31	1007	818	127	125	1608
10 n212-206-227	ok	normal[jv1.bw.on]	48	36	70	1007	720	255	255	1670

也可以通过 Host 输入框输入机器名（支持模糊匹配），然后点击 Check 按钮来筛选 host。

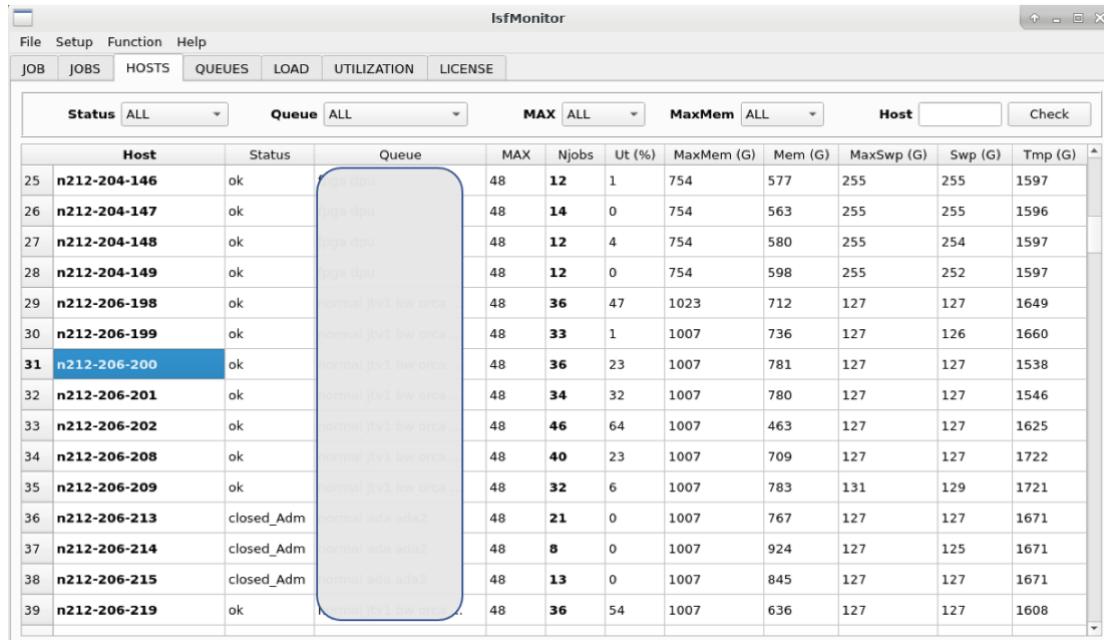


The screenshot shows the lsfMonitor application window with the HOSTS tab selected. At the top, there are dropdown menus for File, Setup, Function, and Help, and tabs for JOB, JOBS, HOSTS, QUEUES, LOAD, UTILIZATION, and LICENSE. Below the tabs is a search bar with dropdowns for Status (ALL), Queue (ALL), MAX (ALL), MaxMem (ALL), and Host (130). A 'Check' button is also part of the search bar. The main area is a table with columns: Host, Status, Queue, MAX, Njobs, Ut (%), MaxMem (G), Mem (G), MaxSwp (G), Swp (G), and Tmp (G). Two rows are visible: row 1 for host n212-207-130 with status ok, and row 2 for host n232-132-130 with status ok. The 'Host' column header and the '130' entry in the search bar are highlighted with a blue box.

	Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
1	n212-207-130	ok		48	0	1	1023	937	127	124	1673
2	n232-132-130	ok		64	9	0	1945	899	127	127	1618

4.2.5.3 HOSTS 页特殊操作/显示

点击 Host 列的服务器名，可以跳转到 LOAD 页，展示指定 host 的 cpu 和 memory 历史用量曲线。



The screenshot shows the lsfMonitor application window with the HOSTS tab selected. The interface is similar to the previous one, with a search bar and a table below. The table has columns: Host, Status, Queue, MAX, Njobs, Ut (%), MaxMem (G), Mem (G), MaxSwp (G), Swp (G), and Tmp (G). The 'Host' column header and the 'n212-204-146' entry in the table are highlighted with a blue box. The table contains 39 rows of host information, with the 31st row ('n212-206-200') also highlighted with a blue box.

	Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
25	n212-204-146	ok		48	12	1	754	577	255	255	1597
26	n212-204-147	ok		48	14	0	754	563	255	255	1596
27	n212-204-148	ok	pga_dpu	48	12	4	754	580	255	254	1597
28	n212-204-149	ok	pga_dpu	48	12	0	754	598	255	252	1597
29	n212-206-198	ok	normal_lv1_lv_ora	48	36	47	1023	712	127	127	1649
30	n212-206-199	ok	normal_lv1_lv_ora	48	33	1	1007	736	127	126	1660
31	n212-206-200	ok	normal_lv1_lv_ora	48	36	23	1007	781	127	127	1538
32	n212-206-201	ok	normal_lv1_lv_ora	48	34	32	1007	780	127	127	1546
33	n212-206-202	ok	normal_lv1_lv_ora	48	46	64	1007	463	127	127	1625
34	n212-206-208	ok	normal_lv1_lv_ora	48	40	23	1007	709	127	127	1722
35	n212-206-209	ok	normal_lv1_lv_ora	48	32	6	1007	783	131	129	1721
36	n212-206-213	closed_Adm	normal_ad1_ad2	48	21	0	1007	767	127	127	1671
37	n212-206-214	closed_Adm	normal_ad1_ad2	48	8	0	1007	924	127	125	1671
38	n212-206-215	closed_Adm	normal_ad1_ad2	48	13	0	1007	845	127	127	1671
39	n212-206-219	ok	normal_lv1_lv_ora	48	36	54	1007	636	127	127	1608



点击 Njobs 列的数字，可以跳转到 JOBS 也，展示指定 host 上所有的 RUN jobs。

The table lists 39 hosts with their status, queue, and various performance metrics. The 'Njobs' column is highlighted with a blue box, indicating it can be clicked to view all running jobs for that host.

	Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
				MAX	ALL	ALL	ALL	ALL	ALL	ALL	ALL
25	n212-204-146	ok	normal	48	12	1	754	577	255	255	1597
26	n212-204-147	ok	normal	48	14	0	754	563	255	255	1596
27	n212-204-148	ok	normal	48	12	4	754	580	255	254	1597
28	n212-204-149	ok	pqa_dpu	48	12	0	754	598	255	252	1597
29	n212-206-198	ok	normal(jv1 bw orca)	48	36	47	1023	712	127	127	1649
30	n212-206-199	ok	normal(jv1 bw orca)	48	33	1	1007	736	127	126	1660
31	n212-206-200	ok	normal(jv1 bw orca)	48	36	23	1007	781	127	127	1538
32	n212-206-201	ok	normal(jv1 bw orca)	48	34	32	1007	780	127	127	1546
33	n212-206-202	ok	normal(jv1 bw orca)	48	46	64	1007	463	127	127	1625
34	n212-206-208	ok	normal(jv1 bw orca)	48	40	23	1007	709	127	127	1722
35	n212-206-209	ok	normal(jv1 bw orca)	48	32	6	1007	783	131	129	1721
36	n212-206-213	closed_Adm	normal(ada ada2)	48	21	0	1007	767	127	127	1671
37	n212-206-214	closed_Adm	normal(ada ada2)	48	8	0	1007	924	127	125	1671
38	n212-206-215	closed_Adm	normal(ada ada2)	48	13	0	1007	845	127	127	1671
39	n212-206-219	ok	normal(jv1 bw orca)	48	36	54	1007	636	127	127	1608

IsfMonitor

File Setup Function Help

JOB JOBS HOSTS QUEUES LOAD UTILIZATION LICENSE

Status RUN		Queue ALL		Host n212-206-200		User		Check		
job	User	Status	Queue	Host	Started	Project	Slot	Rusage (G)	Mem (G)	Command
1 13955	zhangchong	RUN		n212-206-20...	2023-06-05 17:25:02		4	35.8		gmake -f ./...
2 119609	zhangchong	RUN		n212-206-200	2023-06-08 15:25:05		1	2.2	0	vmanager -serve...
3 146540	zhangchong	RUN		n212-206-200	2023-06-09 11:36:15		1	1	1.4	indago -lwd ...
4 149634	yuqinhuai2022	RUN		n212-206-200	2023-06-09 14:38:44		1		7.1	innovus -log LOG...
5 150028	zidepei	RUN		n212-206-200	2023-06-09 15:02:58		1		2.7	verdi -sv -f dut.f ...
6 151622	wangshengguo	RUN		n212-206-20...	2023-06-09 16:32:18		4	3.6	10	dc_shell
7 153430	panqiang	RUN		n212-206-20...	2023-06-09 17:39:14		8	50	56.5	cerebrus/comms...
8 183622	zhangming	RUN		n212-206-20...	2023-06-12 01:03:30		16	78.1	18.4	genus
9 185271	zhangchong	RUN		n212-206-20...	2023-06-12 10:37:51		4	68.4	3.9	make SEED=2 ...

数字内容的列，都可以通过点击列标题进行排序。

IsfMonitor

File Setup Function Help

JOB JOBS HOSTS QUEUES LOAD UTILIZATION LICENSE

Status ALL		Queue ALL		MAX ALL		MaxMem ALL		Host		Check	
Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)	
1 n232-134-068	ok		96	17	0	3993	3379	127	127	2358	
2 n232-135-068	ok		96	15	5	3993	3481	127	127	2367	
3 n232-135-069	ok		96	7	0	3993	3788	127	127	3334	
4 n232-135-070	ok	comet comet_long	96	10	5	3993	3584	127	127	2368	
5 n232-135-071	ok	comet comet_long	96	13	1	3993	3379	127	127	3342	
6 n232-135-072	ok	comet comet_long	96	76	22	3993	105	127	127	2367	
7 n232-135-073	ok	comet comet_long	96	18	13	3993	3481	127	127	2368	
8 n232-135-074	ok	comet comet_long	96	31	6	3993	2969	127	127	3342	
9 n232-135-076	ok	comet comet_long	96	7	1	3993	3686	127	127	2367	
10 n212-204-015	closed_Adm	training vivian ...	64	0	0	1945	1945	127	127	1608	
11 n212-204-021	closed_Adm	normal ada ada2	64	8	0	1945	1740	127	116	1608	
12 n212-204-042	closed_Adm	comet comet_long	64	0	0	1945	1945	127	127	1608	
13 n212-204-045	closed_Adm	comet comet_long	64	8	3	1945	1740	127	126	1608	
14 n212-204-046	closed_Adm	comet comet_long	64	4	14	1945	1843	127	125	1608	
15 n232-132-013	ok	comet comet_long	64	16	0	1945	1843	127	127	1606	

如果 host 的状态异常 (unavail/unreach/closed_LIM)， Status 状态会显示为红色。

如果 host 的 Ut 使用率超过 90%， Ut 值会显示为红色，表示 cpu 过载。

IsfMonitor

File Setup Function Help

JOB JOBS HOSTS QUEUES LOAD UTILIZATION LICENSE

Status ALL Queue ALL MAX ALL MaxMem ALL Host Check

Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
100 n232-132-207	ok	v1_ml	64	59	23	1945	1740	127	127	1704
101 n232-132-208	ok	v1_ml	64	45	1	1945	1740	127	127	1703
102 n232-132-209	ok	v1_ml	64	49	45	1945	1536	127	127	1706
103 n232-132-210	ok	v1_ml	64	53	67	1945	1740	127	127	1706
104 n232-132-211	ok	v1_ml	64	57	26	1945	1536	127	127	1689
105 n232-132-212	ok	v1_ml	64	48	60	1945	1638	127	127	1700
106 n232-132-213	ok	v1_ml	64	53	41	1945	1536	127	127	1687
107 n232-132-214	closed_Adm	v1_ml	64	0	0	1945	1945	127	128	1708
108 n232-132-215	ok	v1_ml	64	56	94	1945	1536	127	127	1702
109 n232-132-216	ok	v1_ml	64	0	0	1945	1945	127	127	1708
110 n232-132-217	ok	v1_ml	64	4	2	1945	1945	127	127	1708
111 n232-133-012	ok	v1_ml	64	8	0	1945	1843	127	127	1579
112 n232-133-013	ok	v1_ml	64	4	1	1945	1740	127	127	1608
113 n232-133-014	ok	v1_ml	64	0	0	1945	1843	127	127	1608
114 n232-133-015	ok	v1_ml	64	8	2	1945	1638	127	127	1604

如果 host 的 memory 可用容量不足 10%，Mem 值会显示为红色，标识 memory 过载。

IsfMonitor

File Setup Function Help

JOB JOBS HOSTS QUEUES LOAD UTILIZATION LICENSE

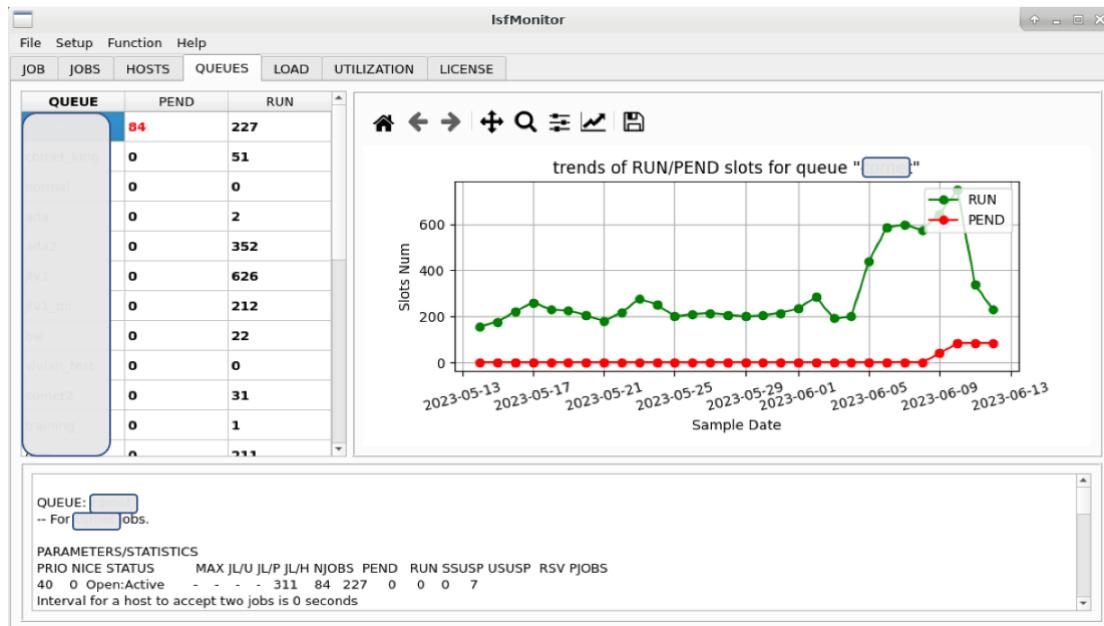
Status ALL Queue ALL MAX ALL MaxMem ALL Host Check

Host	Status	Queue	MAX	Njobs	Ut (%)	MaxMem (G)	Mem (G)	MaxSwp (G)	Swp (G)	Tmp (G)
1 n232-134-068	ok	v1_ml	96	17	0	3993	3379	127	127	2358
2 n232-135-068	ok	comet comet_long	96	15	5	3993	3481	127	127	2367
3 n232-135-069	ok	comet comet_long	96	7	0	3993	3788	127	127	3334
4 n232-135-070	ok	comet comet_long	96	10	5	3993	3584	127	127	2368
5 n232-135-071	ok	comet comet_long	96	13	1	3993	3379	127	127	3342
6 n232-135-072	ok	comet comet_long	96	76	22	3993	105	127	127	2367
7 n232-135-073	ok	comet comet_long	96	18	13	3993	3481	127	127	2368
8 n232-135-074	ok	comet comet_long	96	31	6	3993	2969	127	127	3342
9 n232-135-076	ok	comet comet_long	96	7	1	3993	3686	127	127	2367
10 n212-204-015	closed_Adm	training vivian...	64	0	0	1945	1945	127	127	1608
11 n212-204-021	closed_Adm	normal ada ada2	64	8	0	1945	1740	127	116	1608
12 n212-204-042	closed_Adm	comet comet_long	64	0	0	1945	1945	127	127	1608
13 n212-204-045	closed_Adm	comet comet_long	64	8	3	1945	1740	127	126	1608
14 n212-204-046	closed_Adm	comet comet_long	64	4	14	1945	1843	127	125	1608
15 n232-132-013	ok	v1_ml	64	16	0	1945	1843	127	127	1606

如果 host 的 tmp 可用量变为 0，Tmp 值会显示为红色，标识/tmp 过载。

4.2.6 QUEUES 页

lsmMonitor 的 QUEUES 页，主要用于查看所有 queue 的信息。



如果 queue 中 PEND 的 job 数目不为 0，数字会被红标。

点击 QUEUE 列的队列名，可以展示 queue 的详细信息和 queue 中 PEND/JOB 数据的历史变化曲线。

其中 queue 的 PEND/RUN 历史数据默认展示 30 天，每天的值都是一个统计均值。

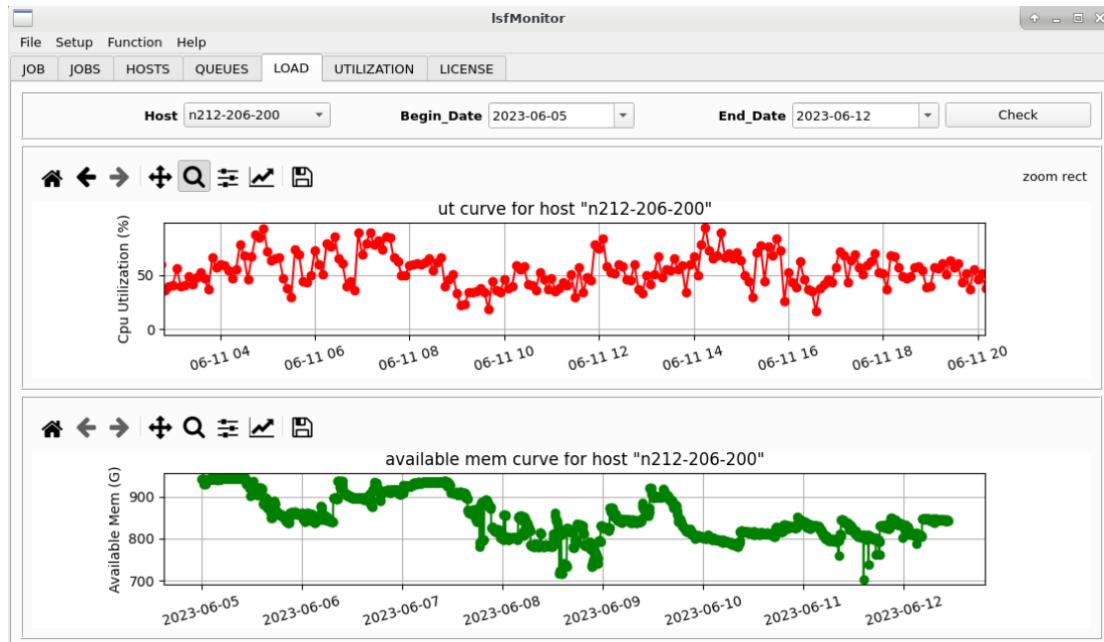
4.2.7 LOAD 页

lsmMonitor 的 LOAD 页，主要用于查看 host 的负载信息。



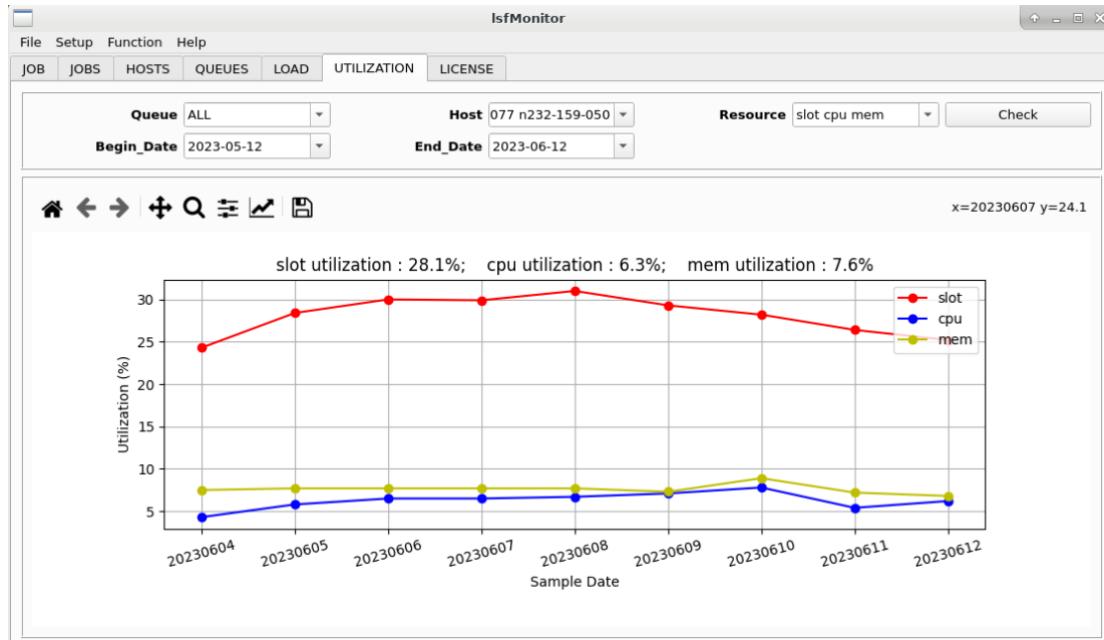
通过 Host 下拉菜单选中服务器，通过 Begin_Date 和 End_Date 选中日期范围，点击 Check 按钮，即可查看服务器的 ut/available_mem 的变化曲线。

其中 ut 和 mem 的曲线均可以通过放大镜按钮放大指定部位（展开时间细节），也可以通过 HOME 按钮恢复原状。



4.2.8 UTILIZATION 页

lsmMonitor 的 UTILIZATION 页，主要用来查看 slot/cpu/memory 等资源的使用率统计信息。



可以通过 Queue 来选择服务器，也可以直接通过 Host 来选择服务器，通过 Resource 来多选要统计的资源项，Begin_Date 和 End_Date 用来统计时间段。选好后，点击 Check。

每种类型的资源，会在标题栏处显示所选日期的利用率均值，也会在折线图中显示所选日期的使用率变化曲线。

4.2.9 LICENSE 页

lsmMonitor 的 LICENSE 页，主要用于查看 EDA license 的使用情况。

启动 lsmMonitor 前，需要保证 LM_LICENSE_FILE 环境变量配置正确。

Server	Vendor	Feature	Issued	In_Use
1 1055@ic-lic02	ansyslmd	nspice_apl	0	
2 1055@ic-lic02	ansyslmd	nspice_hicap	0	
3 1055@ic-lic02	ansyslmd	nspice_sv	0	
4 1055@ic-lic02	ansyslmd	redhawk_apl	0	
5 1055@ic-lic02	ansyslmd	redhawk_caching	0	
6 1055@ic-lic02	ansyslmd	redhawk_gds2def	0	
7 1055@ic-lic02	ansyslmd	redhawk_inductance	0	
8 1055@ic-lic02	ansyslmd	redhawk_lef2def	0	
9 1055@ic-lic02	ansyslmd	redhawk_mpr	0	
10 1055@ic-lic02	ansyslmd	redhawk_netlisting	0	
11 1055@ic-lic02	ansyslmd	redhawk_passchk	0	
12 1055@ic-lic02	ansyslmd	redhawk_pwrcalc	0	
13 1055@ic-lic02	ansyslmd	redhawk_sc_token	3	
14 1055@ic-lic02	ansyslmd	redhawk_spice_pkg	0	

License Server	Feature	Num	Expires
1 1055@ic-lic02	nspice_apl	30-jun-2023	
2 1055@ic-lic02	nspice_apl	30-apr-2023	
3 1055@ic-lic02	nspice_apl	31-mar-2023	
4 1055@ic-lic02	nspice_apl	26-feb-2023	
5 1055@ic-lic02	nspice_apl	28-dec-2022	
6 1055@ic-lic02	nspice_hicap	30-jun-2023	
7 1055@ic-lic02	nspice_hicap	30-apr-2023	
8 1055@ic-lic02	nspice_hicap	31-mar-2023	
9 1055@ic-lic02	nspice_hicap	26-feb-2023	
10 1055@ic-lic02	nspice_hicap	28-dec-2022	
11 1055@ic-lic02	nspice_sv	30-jun-2023	
12 1055@ic-lic02	nspice_sv	30-apr-2023	
13 1055@ic-lic02	nspice_sv	31-mar-2023	
14 1055@ic-lic02	nspice_sv	26-feb-2023	

4.2.9.1 LICENSE 页信息

LICENSE 页会展示“Feature Information”和“Expires Information”两类信息。

其中“Feature Information”指 license 的使用信息，包括如下内容：

Server	Vendor	Feature	Issued	In_use
license server 名	Vendor daemon 名	license feature 名	一般认为是 license file 中 license 的总数，包括过期的部分。	在使用的 license feature 数目。

“Expires Information”值 license 的过期信息，包括如下内容：

License Server	Feature	Num	Expires
license	license feature 名。	License feature	过期日期

server 名		数目	
----------	--	----	--

4.2.9.2 license 信息检索

默认显示所有 license 的信息，也可以按照“Show”，“Server”，“Vendor”来过滤 License 信息。

The screenshot shows the IsfMonitor software interface with the 'LICENSE' tab selected. The 'Server' dropdown is set to '27020@ic-lic02'. The 'Feature Information' table lists various license features issued to this server, including 'SSS', 'ACS', 'BOA-BRT', 'DC-Expert', 'DC-Extension', 'DC-Graphical', 'DC-SDF-Interface', 'DC-Ultra-Features', 'DC-Ultra-Opt', 'Design-Budgeting', 'Design-Compiler', 'Design-Compiler-NXT', 'Design-Vision', and 'DesignWare'. The 'Expires Information' table lists the expiration dates for these features, all of which expire on February 27, 2024.

Server	Vendor	Feature	Issued	In_Use
1 27020@ic-lic02	snpsslmd	SSS	0	
2 27020@ic-lic02	snpsslmd	ACS	0	
3 27020@ic-lic02	snpsslmd	BOA-BRT	1	
4 27020@ic-lic02	snpsslmd	DC-Expert	1	
5 27020@ic-lic02	snpsslmd	DC-Extension	1	
6 27020@ic-lic02	snpsslmd	DC-Graphical	0	
7 27020@ic-lic02	snpsslmd	DC-SDF-Interface	0	
8 27020@ic-lic02	snpsslmd	DC-Ultra-Features	1	
9 27020@ic-lic02	snpsslmd	DC-Ultra-Opt	0	
10 27020@ic-lic02	snpsslmd	Design-Budgeting	0	
11 27020@ic-lic02	snpsslmd	Design-Compiler	1	
12 27020@ic-lic02	snpsslmd	Design-Compiler-NXT	1	
13 27020@ic-lic02	snpsslmd	Design-Vision	1	
14 27020@ic-lic02	snpsslmd	DesignWare	1	

License Server	Feature	Num	Expires
144 27020@ic-lic02	gui		27-feb-2024
145 27020@ic-lic02	gui		27-feb-2024
146 27020@ic-lic02	mixed		27-feb-2024
147 27020@ic-lic02	mixed		27-feb-2024
148 27020@ic-lic02	oemunlock		27-feb-2024
149 27020@ic-lic02	oemunlock		27-feb-2024
150 27020@ic-lic02	save_restore		27-feb-2024
151 27020@ic-lic02	save_restore		27-feb-2024
152 27020@ic-lic02	system_verilog		27-feb-2024
153 27020@ic-lic02	system_verilog		27-feb-2024
154 27020@ic-lic02	verilog		27-feb-2024
155 27020@ic-lic02	verilog		27-feb-2024
156 27020@ic-lic02	vhdl		27-feb-2024
157 27020@ic-lic02	vhdl		27-feb-2024

同时也可以按照 Feature 和 User 来直接检索 License 信息。(Feature 支持模糊检索)

The screenshot shows the IsfMonitor software interface with the 'LICENSE' tab selected. The 'Vendor' dropdown is set to 'Verdi'. The 'Feature Information' table lists two entries for vendor Verdi: 'Verdi' with 21 issued licenses and another 'Verdi' entry with 39 issued licenses. The 'Expires Information' table lists the expiration dates for these Verdi features, with most expiring on February 27, 2024, and one expiring on October 30, 2024.

Server	Vendor	Feature	Issued	In_Use
1 27020@ic-lic02	snpsslmd	Verdi	21	
2 27020@ic-lic03	snpsslmd	Verdi	39	

License Server	Feature	Num	Expires
1 27020@ic-lic02	Verdi		27-feb-2024
2 27020@ic-lic02	Verdi		30-oct-2024
3 27020@ic-lic03	Verdi		31-mar-2023
4 27020@ic-lic03	Verdi		28-feb-2023
5 27020@ic-lic03	Verdi		21-jan-2023
6 27020@ic-lic03	Verdi		17-dec-2022
7 27020@ic-lic03	Verdi		27-feb-2024
8 27020@ic-lic03	Verdi		30-oct-2024
9 27020@ic-lic03	Verdi		02-jul-2023
10 27020@ic-lic03	Verdi		11-jun-2023
11 27020@ic-lic03	Verdi		01-jun-2023
12 27020@ic-lic03	Verdi		01-may-2023
13 27020@ic-lic03	Verdi		31-mar-2023

4.2.9.3 LICENSE 页特殊操作/显示

数字内容的列，都可以通过点击列标题进行排序。

The screenshot shows the IsfMonitor software interface with the LICENSE tab selected. The Feature Information table has columns: Server, Vendor, Feature, Issued, and n_Use. The Expires Information table has columns: License Server, Feature, Num, and Expires. A red arrow points to the 'n_Use' column in the Feature Information table.

Feature Information					Expires Information			
	Server	Vendor	Feature	Issued	License Server	Feature	Num	Expires
1	cdslmd	Virtuoso_Multi_mo...		196	1055@ic-lic02	nspice_apl		30-jun-2023
2	cdslmd	Palladium_Z1_Dom...		177	1055@ic-lic02	nspice_apl		30-apr-2023
3	cdslmd	Innovus_Impl_Syst...		100	1055@ic-lic02	nspice_apl		31-mar-2023
4	cdslmd	Innovus_5nm_Opt		94	1055@ic-lic02	nspice_apl		26-feb-2023
5	cdslmd	Palladium_22_Dom...		72	1055@ic-lic02	nspice_apl		28-dec-2022
6	cdslmd	Innovus_CPU_Opt		67	1055@ic-lic02	nspice_hicap		30-jun-2023
7	ansyslmd	SC_WG		56	1055@ic-lic02	nspice_hicap		30-apr-2023
8	snpslmd	VCS-2-Elite-Base-...		40	1055@ic-lic02	nspice_hicap		31-mar-2023
9	snpslmd	VCS-BASE-RUNTIME		34	1055@ic-lic02	nspice_hicap		26-feb-2023
10	cdslmd	Cerebrus_Innovus		30	1055@ic-lic02	nspice_hicap		28-dec-2022
11	snpslmd	Verdi-2-Elite-Pkg		30	1055@ic-lic02	nspice_sv		30-jun-2023
12	snpslmd	Verdi		30	1055@ic-lic02	nspice_sv		30-apr-2023
13	cdslmd	Xcellium_Single_Core		29	1055@ic-lic02	nspice_sv		31-mar-2023
14	snpslmd	Verdi-2-Elite-Pkg		22	1055@ic-lic02	nspice_sv		26-feb-2023

左侧 Feature Information 表格中“In_Use”列的内容，如果非零，点击可以弹出 license feature 的使用详情。

其中 START_TIME 启动时间在 3 天以前的，日期会标红。另外每个被 check 出去的 license feature，如果能找到对应的 job，会在最右侧的 JOB 列显示出 jobid（空说明 job 完成但 license 没释放，“*”说明找到多个对应关系）。

The screenshot shows the IsfMonitor software interface with the LICENSE tab selected. An expanded view of a license usage entry for 'Verdi' is shown. The expanded table has columns: USER, SUBMIT_HOST, EXECUTE_HOST, NUM, VERSION, START_TIME, and JOB. A red arrow points to the 'User' column in the expanded table.

"Verdi" usage on 27020@ic-lic03/snpslmd							
	USER	SUBMIT_HOST	EXECUTE_HOST	NUM	VERSION	START_TIME	JOB
1	5280@n1	n232-135-067	n232-134-073	1	v2018.12	Tue 9/5 9:05	
2	5280@n1	n232-135-013	n232-132-200	1	v2021.03	Fri 9/8 9:50	1721705
3	5280@n1	n232-134-067	n232-132-203	1	v2018.12	Sat 9/9 10:22	
4	5280@n1	n232-134-067	n232-135-069	1	v2021.03	Sun 9/10 10:00	1891420
5	5280@n1	n232-135-013	n232-135-074	1	v2021.03	Tue 9/12 9:52	1944551
6	5280@n1	n232-134-194	n232-132-022	1	v2021.03	Tue 9/12 11:04	*
7	27020@i	n232-134-067	n232-135-070	1	v2021.03	Tue 9/12 21:44	1840939
8	27020@i	n232-134-194	n232-132-028	1	v2021.03	Wed 9/13 10:44	1991964
9	5280@n1	n232-134-194	n232-135-072	1	v2021.03	Wed 9/13 18:41	*
10	27020@i	n232-134-194	n232-133-076	1	v2021.03	Thu 9/14 14:36	1912341
11	27020@i	n232-135-066	n232-132-144	1	v2021.03	Thu 9/14 15:24	2190171
13	5280@n147-051-105	cdslmd	Liberate_Unified_Ma...	96	33	13 27020@ic-synopsys...	DWC-coreAssembler
14	27020@ic-lic03	snpslmd	PrimeTime	80	32	14 27020@ic-synopsys...	DWC-ralgen

右侧 Expires Information 表格中“Expires”列的内容，如果已过期，显示为灰色字体；如果两周内过期，显示为红色字体；如果未过期，显示为黑色字体。

The screenshot shows the IsfMonitor application interface. On the left, there is a 'Feature Information' table with columns: Server, Vendor, Feature, Issued, and Us. On the right, there is an 'Expires Information' table with columns: License Server, Feature, Num, and Expires. The 'Expires' column uses color coding: black for valid, red for soon-to-expire (within 2 weeks), and gray for expired. Annotations on the right side of the screen categorize the rows:

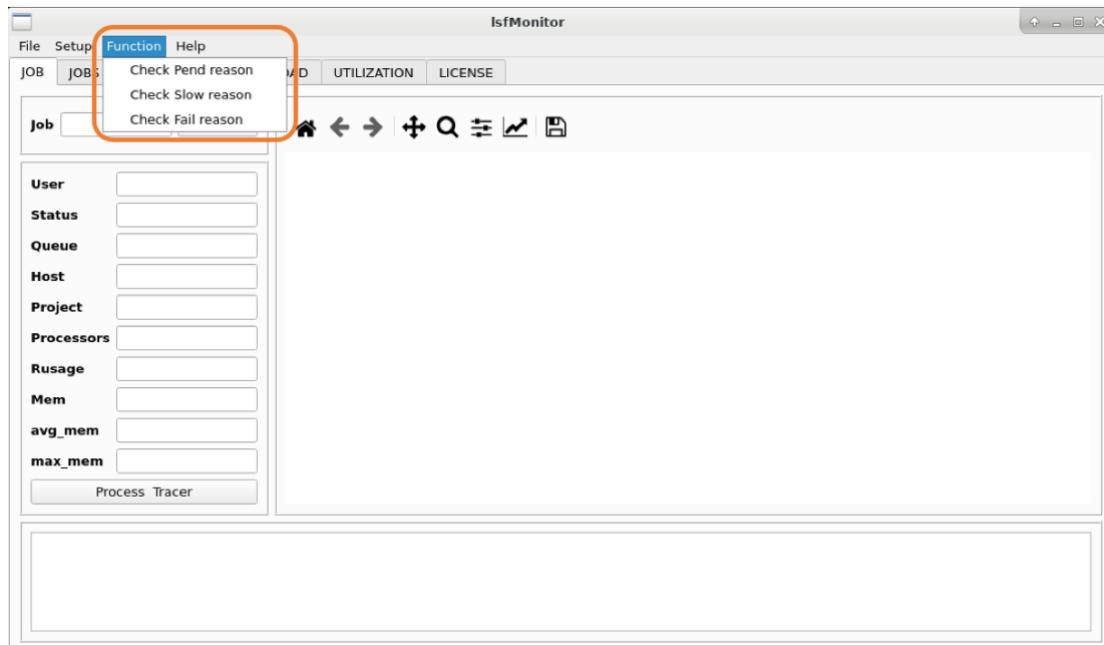
- 未过期 (Not Expired):** Rows where the 'Expires' date is in black.
- 已过期 (Expired):** Rows where the 'Expires' date is in gray.
- 即将过期 (Soon to Expire):** Rows where the 'Expires' date is in red.

Feature Information				Expires Information			
Server	Vendor	Feature	Issued	License Server	Feature	Num	Expires
1	cdslmd	Virtuoso_Multi_mo...	196	539	1717@ic-lic03	mittsmembrepair_c	29-apr-2022
2	cdslmd	Palladium_Z1_Dom...	177	540	1717@ic-lic03	mittsmemorybist_c	24-mar-2022
3	cdslmd	Innovus_Impl_Syst...	100	541	1717@ic-lic03	mittsmemorybist_c	14-mar-2024
4	cdslmd	Innovus_5nm_Opt	94	542	1717@ic-lic03	mittsmemorybist_c	29-apr-2022
5	cdslmd	Palladium_Z2_Dom...	72	543	1717@ic-lic03	verifdataport	24-mar-2022
6	cdslmd	Innovus_CPU_Opt	67	544	1717@ic-lic03	verifdataport	9-sep-2022
7	ansyslmd	SC_WG	56	545	1717@ic-lic03	verifdataport	14-mar-2024
8	snpsslmd	VCS-2-Elite-Base...	40	546	1717@ic-lic03	verifdataport	29-apr-2022
9	snpsslmd	VCS-BASE-RUNTIME	34	547	1717@ic-lic03	calmpgold	29-sep-2024
10	cdslmd	Cerebrus_Innovus	30	548	1717@ic-lic03	calmpgold	14-nov-2022
11	snpsslmd	Verdi-2-Elite-Pkg	30	549	1717@ic-mentor-lic02	afsace	16-jun-2023
12	snpsslmd	Verdi	29	550	1717@ic-mentor-lic02	afshb	16-jun-2023
13	cdslmd	Xcelium_Single_Core	22	551	1717@ic-mentor-lic02	afslicense	16-jun-2023
14	snpsslmd	Verdi-2-Elite-Pkg		552	1717@ic-mentor-lic02	afswavecrave	16-jun-2023

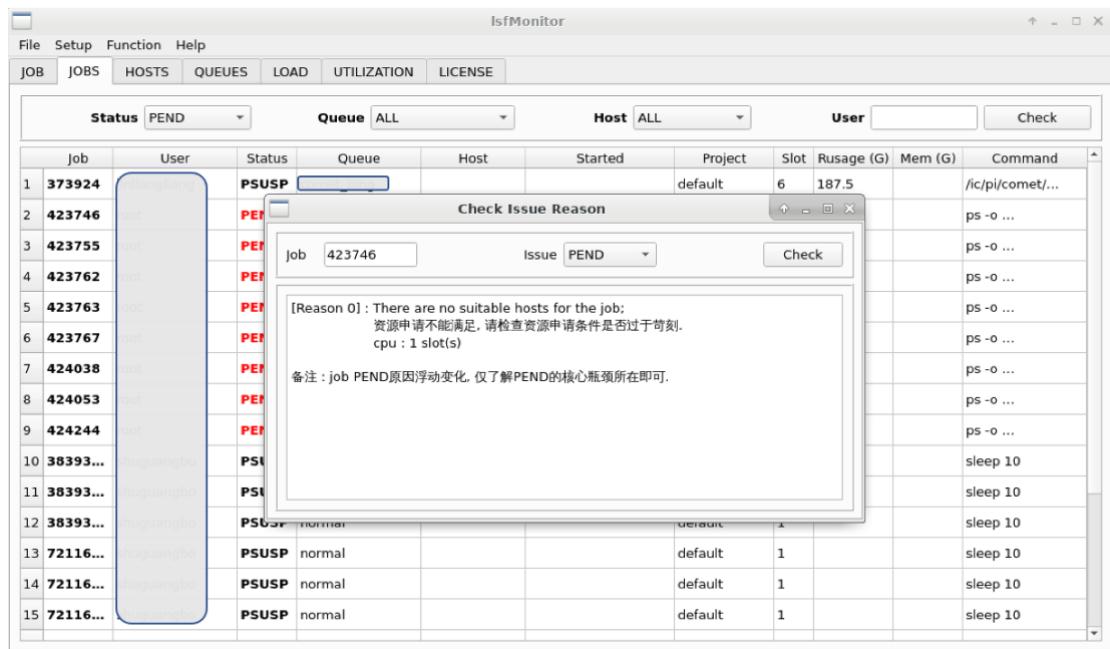
4.2.10 其它功能

4.2.10.1 异常 job 问题检查

菜单栏 Function 中包含 job pend/slow/fail 原因查询功能。



在弹出的 Check Issue Reason 工具中，输入 jobid，点击“Check”按钮，如果显示相关问题的检测结果。



五、辅助工具

lsmMonitor 自带一些工具，大多数是其功能组件，也有部分是可以单独使用的工具。

Bash

```
[liyanqing.1987@n212-206-207 lsfMonitor]$ ls monitor/tools/  
check_issue_reason check_issue_reason.py message.py patch  
patch.py process_tracer process_tracer.py seedb seedb.py  
show_license_feature_usage show_license_feature_usage.py
```

check_issue_reason: 组件，图形界面工具，查看 job PEND/FAIL/SLOW 的原因。

message.py: 组件，图形界面工具，显示指定信息。

patch.py: 组件，用于更新工具安装包。

process_tracer: 组件，图形界面工具，追踪指定 process 或 jobid 的进程树。

seedb: 独立工具，查看 sqlite3 文本数据库内容，lsmMonitor 即使用 sqlite3 保存相关数据。

show_license_feature_usage: 组件，图形界面工具，查看 feature 的使用情况。

5.1 seedb

seedb 是查看 sqlite3 文本数据库内容的工具，其帮助信息如下：

Bash

```
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/seedb -h  
usage: seedb.py [-h] -d DATABASE [-t TABLES [TABLES ...]] [-k KEYS  
[KEYS ...]] [-n NUMBER]
```

optional arguments:

-h, --help show this help message and exit

-d DATABASE, --database DATABASE
Required argument, specify the database
file.

-t TABLES [TABLES ...], --tables TABLES [TABLES ...]
Specify the tables you want to review,
make sure the tables exist.

-k KEYS [KEYS ...], --keys KEYS [KEYS ...]
Specify the table keys you want to review,
make sure the table keys exist.

-n NUMBER, --number NUMBER

How many lines you want to see.

--database: 指定 sqlite3 数据库文件。

--tables: 指定想查看的数据库 tables。

--keys: 指定想查看的 table 关键词。

--number: 指定查看的行数, 如果内容很多, 可以截取有限的内容查看。

示例一, 查看 load.db 数据库中的表。

Bash

```
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/seedb -d /ic/software/cad_data/it/lsfMonitor/db/monitor/load.db
DB_FILE : /ic/software/cad_data/it/lsfMonitor/db/monitor/load.db
TABLES  :
=====
load_ic-hpc-mon02
load_ic-lsfmaster1
load_ic-lsfmaster2
...
=====
```

示例二, 查看 load.db 数据库中指定的表 (load_n212-206-211) 的内容。

Bash

```
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/seedb -d /ic/software/cad_data/it/lsfMonitor/db/monitor/load.db -t
load_n212-206-211
DB_FILE : /ic/software/cad_data/it/lsfMonitor/db/monitor/load.db
TABLE   : load_n212-206-211
=====
sample_second      sample_time      ut
tmp                swp            mem
----              ----           -----
----              ----           -----
1683984602        20230513_213002  0%
1671G              252.8G          773G
1683984902        20230513_213502  0%
1671G              252.8G          809G
...  
-----
```

```
=====
```

示例三，查看 load.db 数据库中指定的表 (load_n212-206-211) 的指定列 (mem) 的内容。

Bash

```
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/seedb -d  
/ic/software/cad_data/it/lsfMonitor/db/monitor/load.db -t  
load_n212-206-211 -k mem  
DB_FILE : /ic/software/cad_data/it/lsfMonitor/db/monitor/load.db  
TABLE   : load_n212-206-211  
=====  
mem  
----  
773G  
809G  
845G  
886G  
903G  
...  
=====
```

示例四，查看 load.db 数据库中指定的表 (load_n212-206-211) 的指定列 (mem) 的内容，只看前三行。

Bash

```
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/seedb -d  
/ic/software/cad_data/it/lsfMonitor/db/monitor/load.db -t  
load_n212-206-211 -k mem -n 3  
DB_FILE : /ic/software/cad_data/it/lsfMonitor/db/monitor/load.db  
TABLE   : load_n212-206-211  
=====  
mem  
----  
773G  
809G  
845G  
=====
```

5.2 patch

patch 是帮助 lsfMonitor 打补丁的工具，其帮助信息如下。

```
TypeScript
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/patch -h
usage: patch.py [-h] [-p PATCH_PATH]

optional arguments:
-h, --help            show this help message and exit
-p PATCH_PATH, --patch_path PATCH_PATH
                      Specify patch path (new install package
path).
```

--patch_path: 指定补丁包（也就是新的安装包）路径。

一般而言，lsfMonitor 的版本变更，主要是新增 python 脚本，或者是现有 python 脚本内容变更，针对这种变更的安装包，patch 可以自动将新的安装包变更更新到当前安装包。

下面是一个示例。

```
TypeScript
[liyanqing.1987@n212-206-207 lsfMonitor]$ monitor/tools/patch -p
/ic/data/usr/liyanqing.1987/test/lsfMonitor-master
Install Path : /ic/data/usr/liyanqing.1987/test/lsfMonitor
Patch    path : /ic/data/usr/liyanqing.1987/test/lsfMonitor-master

*Warning*: current install path name is "lsfMonitor", but patch
path name is "lsfMonitor-master".
Do you want to continue? (y|n) y

> Copying python file
"/ic/data/usr/liyanqing.1987/test/lsfMonitor-
master/monitor/bin/bsample.py" into
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/bin/bsample.p
y".
> Copying python file
"/ic/data/usr/liyanqing.1987/test/lsfMonitor-
master/monitor/common/common_license.py" into
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/common/common
_license.py".
```

```
> Copying python file
"/ic/data/usr/liyanqing.1987/test/lsfMonitor-
master/monitor/tools/seedb.py" into
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/seedb.p
y".
> Copying python file
"/ic/data/usr/liyanqing.1987/test/lsfMonitor-
master/monitor/tools/patch.py" into
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/patch.p
y".
> Copying python file
"/ic/data/usr/liyanqing.1987/test/lsfMonitor-
master/monitor/tools/tool_1.py" into
"/ic/data/usr/liyanqing.1987/test/lsfMonitor/monitor/tools/tool_1.
py".
```

5.3 akill

akill 是 bkill 的增强型工具，位于安装目录下的 monitor/tools/akill，可以根据 jobid/job_name/command/submit_time/execute_host/queue/user 等维度来便捷地 kill job，其帮助信息如下。

```
Python
[liyanqing.1987@n232-134-130 it]$ akill -h
usage: akill.py [-h] [-j JOBID [JOBID ...]] [-J JOB_NAME
[JOB_NAME ...]] [-c COMMAND [COMMAND ...]] [-s SUBMIT_TIME
[SUBMIT_TIME ...]] [-m EXECUTE_HOST [EXECUTE_HOST ...]]
[-q QUEUE [QUEUE ...]] [-u USER [USER ...]]
```

optional arguments:

- h, --help show this help message and exit
- j JOBID [JOBID ...], --jobid JOBID [JOBID ...]
kill specified job(s) based on jobid(s),
support fuzzy matching, also support jobid range like "10200-
10450".
- J JOB_NAME [JOB_NAME ...], --job_name JOB_NAME [JOB_NAME ...]
kill specified job(s) based on
job_name(s), support fuzzy matching.
- c COMMAND [COMMAND ...], --command COMMAND [COMMAND ...]
kill specified job(s) based on command(s),
support fuzzy matching.
- s SUBMIT_TIME [SUBMIT_TIME ...], --submit_time SUBMIT_TIME

```
[SUBMIT_TIME ...]
                           kill specified job(s) based on
submit_time(s), support fuzzy matching.
-m EXECUTE_HOST [EXECUTE_HOST ...], --execute_host EXECUTE_HOST
[EXECUTE_HOST ...]
                           kill specified job(s) based on execute
host(s).
-q QUEUE [QUEUE ...], --queue QUEUE [QUEUE ...]
                           kill specified job(s) based on queue(s).
-u USER [USER ...], --user USER [USER ...]
                           kill specified job(s) based on user(s).
```

akill 更详细的用法, 请参照 `lsm` 安装目录下的 `docs/akill_user_manual.pdf`。

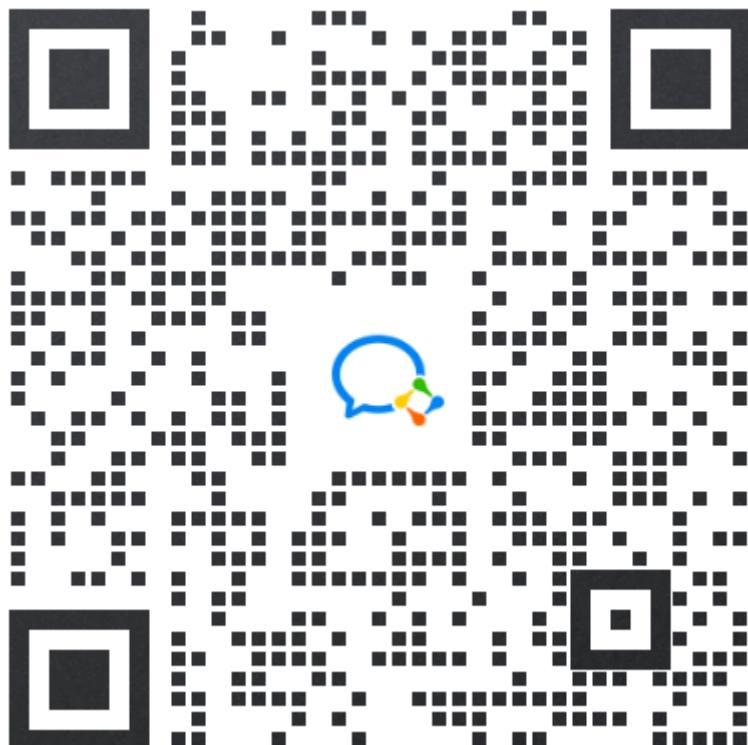
六、技术支持

本工具为开源工具，由开源社区维护，可以提供如下类型的技术支持：

- 部署和使用技术指导。
- 接收 bug 反馈并修复。
- 接收功能修改建议。(需审核和排期)

获取技术支持的方式包括：

- 通过 Contact 邮箱联系开发者。
- 加入官方技术支持群。



附录

附 1. 变更历史

日期	版本	变更描述	备注
2017	1.0	发布第一个版本 openlavaMonitor, 仅支持 openlava。	
2020	1.1	更名 lsfMonitor, 增加对 LSF 的支持。	
2022	1.2	增加 LICENSE 信息的采集和展示。	
2023.5	1.3	增加 UTILIZATION 信息的采集和展示。 增加 patch 工具。 优化数据库数据格式。	数据库格式跟旧版本不兼容, 需要清空旧数据库后重新采样。
2023.6	1.3.1	优化 utilization 数据采样和取用方式, 采样时汇聚。 优化 EDA license 信息采样操作, 通过 multi-process 方式并行大幅缩短采样时间。	
2023.6	1.3.2	HOSTS 页增加按照 Status/MA/MaxMem/Host 选择 hosts 的过滤功能。 LICENSE 页增加按照 User 选择 license feature 的过滤功能。	
2023.9	1.3.3	show_license_feature_usage 页面显示 feature 跟 job 的关联关系。 增加工具 akill, 帮助更快捷地 kill job。 Check 按钮自动触发 LSF/LICENSE 信息的重新采集, 保证刷新功能。	