NHR FAU

Friedrich-Alexander-Universität
Erlangen-Nürnberg

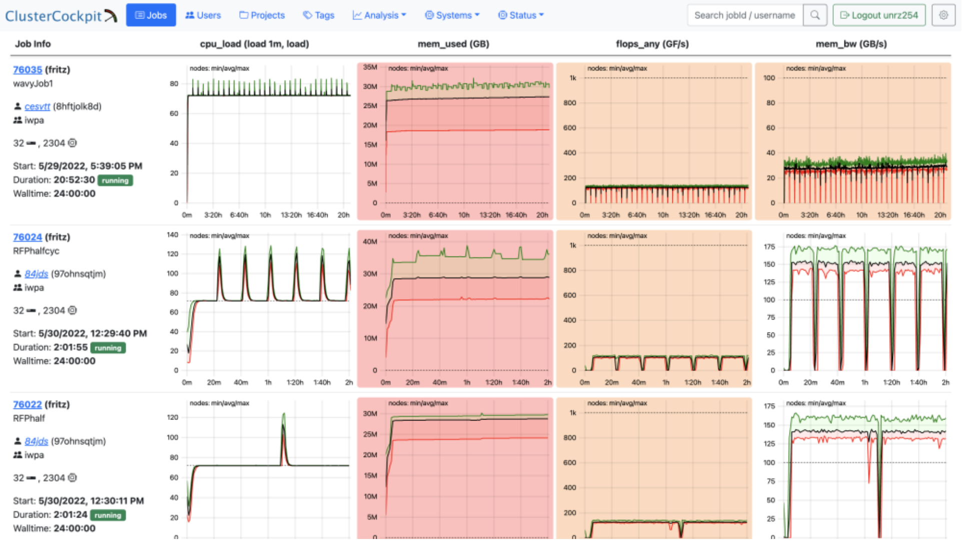
ClusterCockpit Monitoring Service

Jan Eitzinger, 10.01.2023

ClusterCockpit

Overview

- Web-based job-specific performance monitoring
- Rudimentary job accounting and access to job performance metric data
- User Authentication with IDM HPC accounts
- **HPC-Portal** accounts only start session from within Portal
- ClusterCockpit Framework developed at NHR@FAU



76035 (fritz)
wavyJob1
cesvtt (8hftjolk8d)
iwpa
32, 2304
Start: 5/29/2022, 5:39:05 PM
Duration: 20:52:30 running
Walltime: 24:00:00

76024 (fritz)
RFPhalfcyc
84jds (97ohnsqtjm)
iwpa
32, 2304
Start: 5/30/2022, 12:29:40 PM
Duration: 2:01:55 running
Walltime: 24:00:00

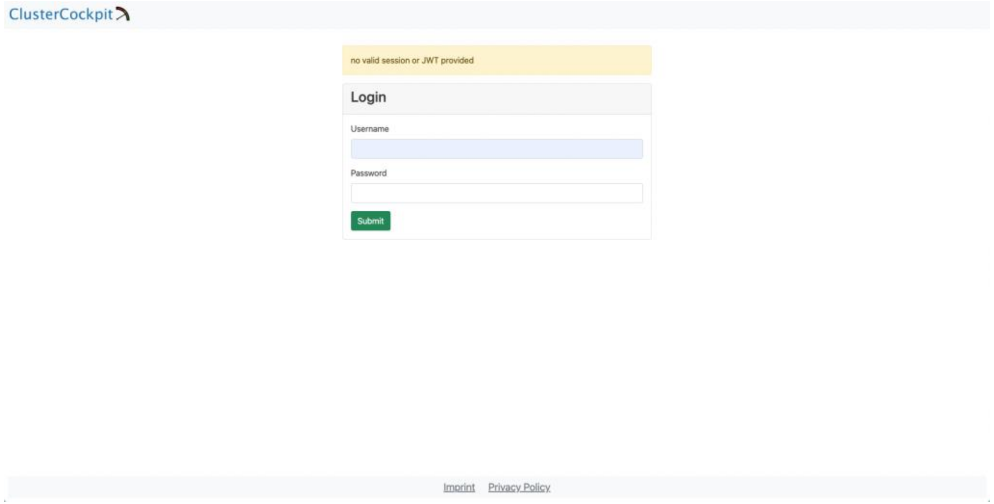
76022 (fritz)
RFPhalf
84jds (97ohnsqtjm)
iwpa
32, 2304
Start: 5/30/2022, 12:30:11 PM
Duration: 2:01:24 running
Walltime: 24:00:00

https://github.com/ClusterCockpit/

Access to ClusterCockpit

URL: https://monitoring.nhr.fau.de/

- Login with **IDM HPC account**
- **HPC Portal users can start session from within Portal**



no valid session or JWT provided

Login

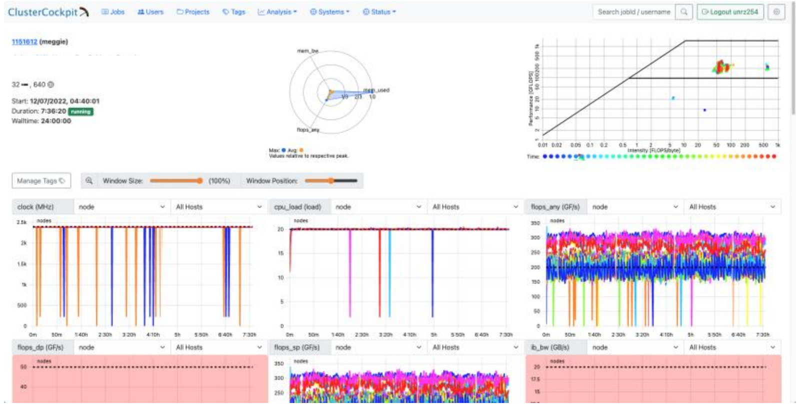
Username

Password

- You can see **your running** and **completed jobs**
- Future: Project managers can see jobs from all users in a project

Purpose and use cases

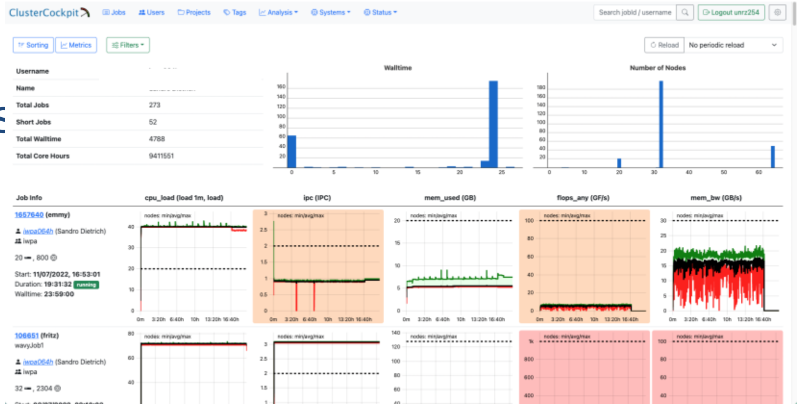
- **Access to job performance metrics**
  - **Feedback** about job performance
  - Identify **pathological jobs** early on
  - **Monitor** and **classify** your job performance
- **Simple job monitoring and accounting**
  - **Overview** about running and completed jobs
  - **Histograms** about walltime and node count
  - Powerful **filter** and **search** features
  - **Tag jobs** to group and organize your jobs



1151612 (meggie)

32, 640

Start: 12/07/2022, 04:40:01
Duration: 7:36:20 running
Walltime: 24:00:00



Username	
Name	
Total Jobs	273
Short Jobs	52
Total Walltime	4788
Total Core Hours	9411551

Job Info

1657640 (emmy)
iwpa064h (Sandro Dietrich)
iwpa
20, 800
Start: 11/07/2022, 16:53:01
Duration: 19:31:32 running
Walltime: 23:59:00

106651 (fritz)
wavyJob1
iwpa064h (Sandro Dietrich)
iwpa
32, 2304

Empirical roofline plot

How fast can tasks be processed? $\boldsymbol{P}$ [flop/s]

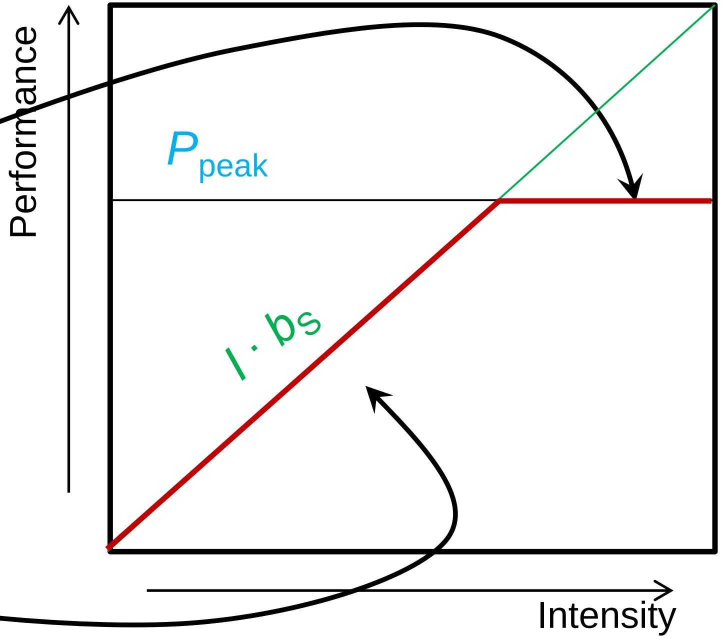
The bottleneck is either

- The execution of work: P_{peak} [flop/s]
- The data path: $I \cdot b_S$ [flop/byte x byte/s]

This is the “Naïve Roofline Model”

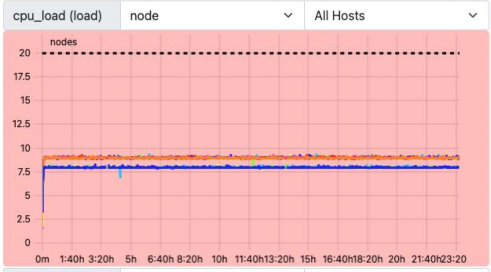
- High intensity: P limited by execution
- Low intensity: P limited by data transfer
- “Knee” at $P_{max} = I \cdot b_S$:
  Best use of resources

Measured using hardware performance counter data

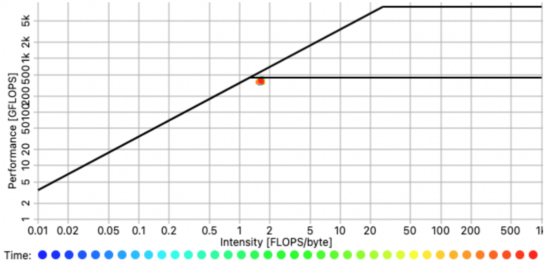


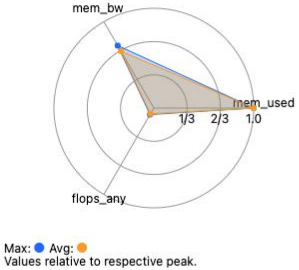
How to detect bad jobs

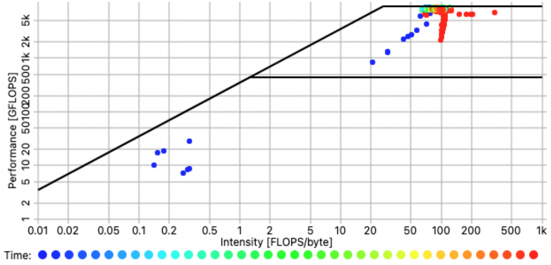
- Load metric indicates allocation or placement issues

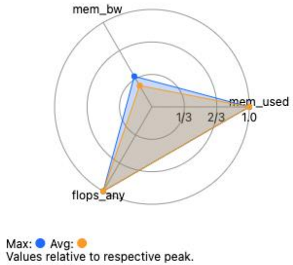

cpu_load (load)
node
All Hosts
nodes
20
17.5
15
12.5
10
7.5
5
2.5
0
0m 1:40h 3:20h 5h 6:40h 8:20h 10h 11:40h 13:20h 15h 16:40h 18:20h 20h 21:40h 23:20

- Basic resource utilization (arithmetic and memory bandwidth) can be seen in the roofline and polar plots

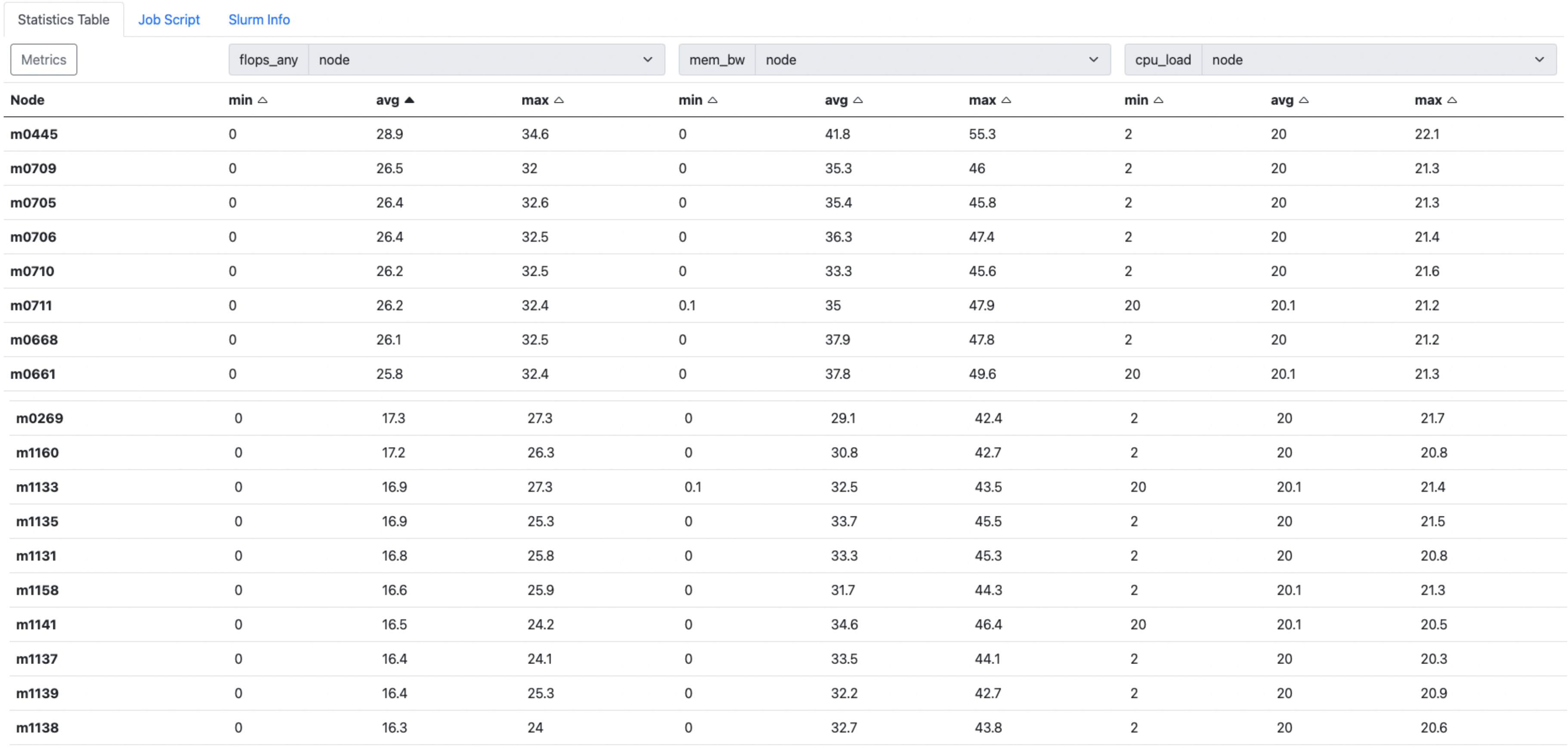








Node statistic table to detect performance imbalance



Metrics	flops_any node			mem_bw node			cpu_load node		
Node	min △	avg ▲	max △	min △	avg △	max △	min △	avg △	max △
m0445	0	28.9	34.6	0	41.8	55.3	2	20	22.1
m0709	0	26.5	32	0	35.3	46	2	20	21.3
m0705	0	26.4	32.6	0	35.4	45.8	2	20	21.3
m0706	0	26.4	32.5	0	36.3	47.4	2	20	21.4
m0710	0	26.2	32.5	0	33.3	45.6	2	20	21.6
m0711	0	26.2	32.4	0.1	35	47.9	20	20.1	21.2
m0668	0	26.1	32.5	0	37.9	47.8	2	20	21.2
m0661	0	25.8	32.4	0	37.8	49.6	20	20.1	21.3
m0269	0	17.3	27.3	0	29.1	42.4	2	20	21.7
m1160	0	17.2	26.3	0	30.8	42.7	2	20	20.8
m1133	0	16.9	27.3	0.1	32.5	43.5	20	20.1	21.4
m1135	0	16.9	25.3	0	33.7	45.5	2	20	21.5
m1131	0	16.8	25.8	0	33.3	45.3	2	20	20.8
m1158	0	16.6	25.9	0	31.7	44.3	2	20.1	21.3
m1141	0	16.5	24.2	0	34.6	46.4	20	20.1	20.5
m1137	0	16.4	24.1	0	33.5	44.1	2	20	20.3
m1139	0	16.4	25.3	0	32.2	42.7	2	20	20.9
m1138	0	16.3	24	0	32.7	43.8	2	20	20.6

Outlook

- **Ongoing work on**:
  - Intuitive Job performance visualization
  - Automatic Job classification
  - Automatic application tagging

- **Please open a ticket if you encounter a problem!**

Any remarks or questions?

DEMO