NSF/IUCRC CAC PROJECT

MONITORING, VISUALIZING, AND PREDICTING HEALTH STATUS OF HPC CENTERS

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04/24/2020

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LOAD AVERAGE & CPU USAGE

Univa Corporation

Univa Grid Engine Documentation

Univa Grid Engine Administrator's Guide

Author:
Univa Engineering

Version:
8.5.4

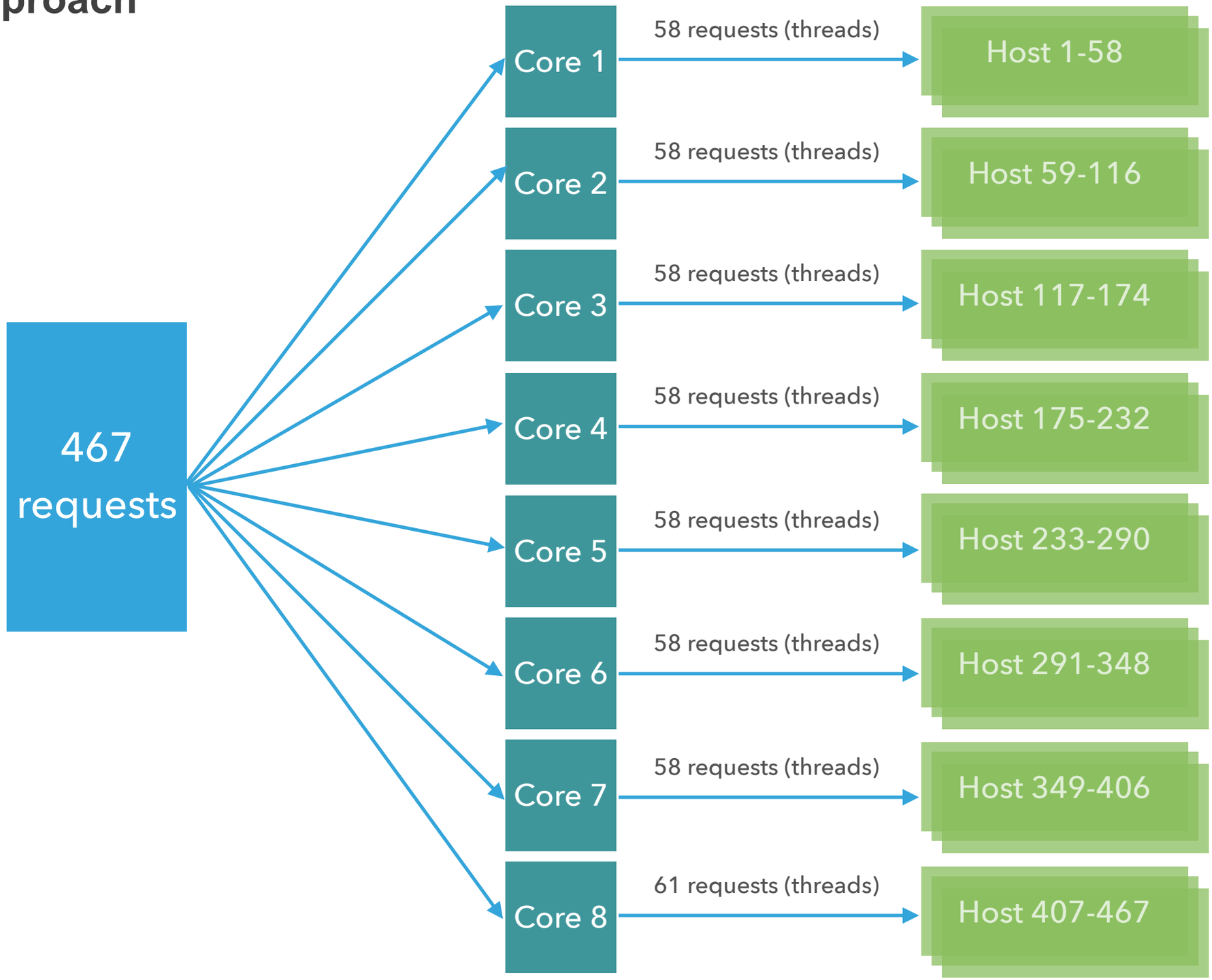
State	Description
swap_total	The total amount of installed swap space.
virtual_total	Total amount of virtual memory (memory + swap space).
load_avg	Same as load_medium.
load_short	Average load value in the last minute (time interval may differ on OS; source on Linux is `/proc/loadavg`).
load_medium	Average load value in the last 5 minutes (time interval may differ on OS; source on Linux is `/proc/loadavg`).
load_long	Average load value in the last 15 minutes (time interval may differ on OS; source on Linux is `/proc/loadavg`).
mem_free	The amount of unused memory.
swap_free	The amount of unused swap space.
virtual_free	The amount of unused virtual memory.
mem_used	The amount of occupied memory.
swap_used	The amount of occupied swap space.
virtual_used	The amount of occupied virtual memory.
cpu	Current amount of CPU usage.
m_topology	Execution host topology information (S means socket, C core, and T hardware supported thread).
m_topology_inuse	Execution host topology like above. Additionally occupied (via core binding) cores are displayed in lower case letters.
m_socket	The number of CPU sockets.
m_core	The total number of CPU cores.
m_thread	The total number of hardware supported threads.
np_load_avg	Medium average divided by number of processors (num_proc).
np_load_short	Short load average divided by the number of processors (num_proc).
np_load_medium	Medium load average divided by the number of processors (num_proc).
np_load_long	Long load average divided by the number of processors (num_proc).
display_win_gui	On Windows (win-x86) only, this value denotes if the execution host is able to display the GUI of a job on the currently visible desktop.

LOAD AVERAGE & CPU USAGE


```
"resourceNumericValues": {
  "num_proc": 72,
  "virtual_total": 302211078816,
  "m_mem_total_n0": "95.909G",
  "m_mem_total": "191.908G",
  "arch": "lx-amd64",
  "mem_used": 85477365383,
  "cpu": 50.1,
  "m_mem_total_n1": "96.000G",
  "m_mem_used": "84.434G",
  "m_topology": "SCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTSCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTT",
  "m_cache_l2": "256.000K",
  "swap_total": 99482179994,
  "m_socket": 2,
  "load_avg": 35.66,
  "m_numa_nodes": "2.000000",
  "m_mem_free_n1": "53.880G",
  "m_mem_free_n0": "50.491G",
  "m_cache_l1": "32.000K",
  "m_core": 36,
  "m_thread": 72,
  "m_topology_inuse": "SCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTSCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTT",
  "np_load_avg": 0.495278,
  "load_medium": 35.66,
  "m_topology_numa": "[SCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTT][SCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTTCTT]",
  "mem_total": 202727825080,
  "m_cache_l3": "45.000M",
  "load_short": 35.97,
  "np_load_short": 0.499583,
  "m_mem_free": "107.475G",
  "docker": 0,
  "swap_used": 20585778250,
  "mem_free": 117250459697,
  "np_load_medium": 0.495278,
  "virtual_free": 196146861441,
  "m_mem_used_n1": "42.120G",
  "virtual_used": 106064217375,
  "swap_free": 78896401744,
  "m_mem_used_n0": "45.418G",
  "load_long": 35.59,
  "np_load_long": 0.494306
},
```

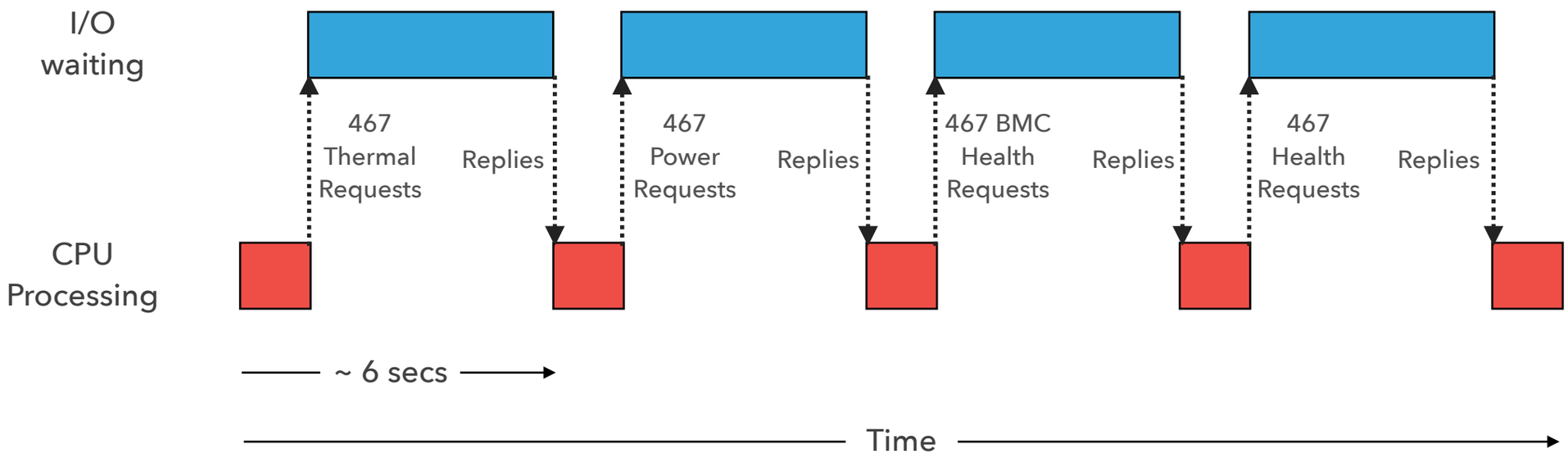
RETHINKING METHODOLOGY OF FETCHING BMC METRICS

Current approach



Ref: Defining Classes of Metrics and Policies for Efficient Data Center Monitoring, Presented by Mr. Ghazanfar Ali, 2/27/2019

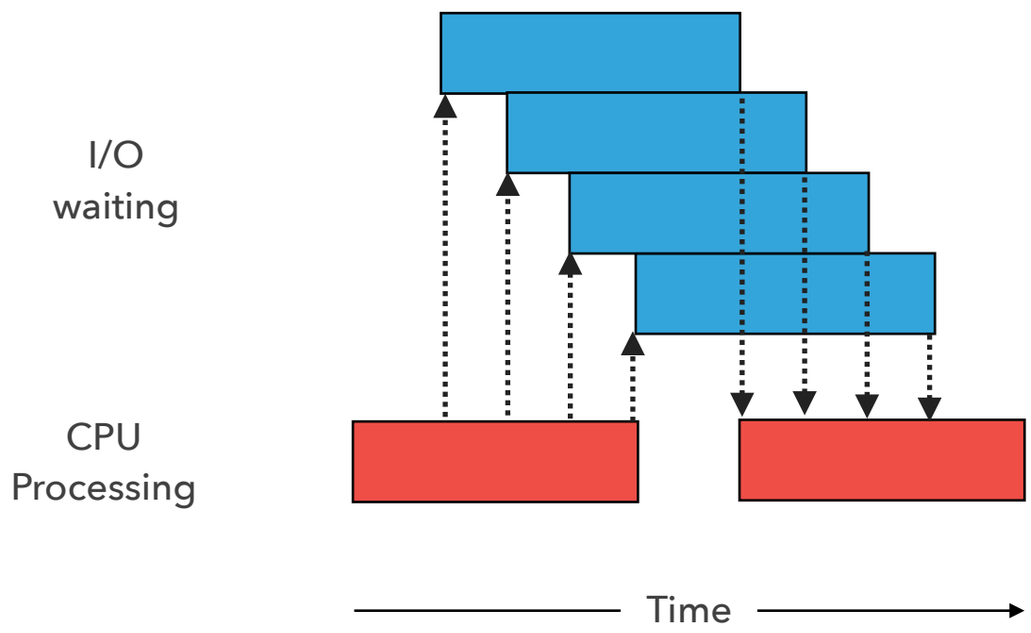
Current approach



- Synchronous, blocks the application while waiting for the server to reply
- Around 58 threads running on the same core, which may degrade the performance because of GIL (Global Interpreter Lock)

https://wiki.python.org/moin/GlobalInterpreterLock

Possible approach

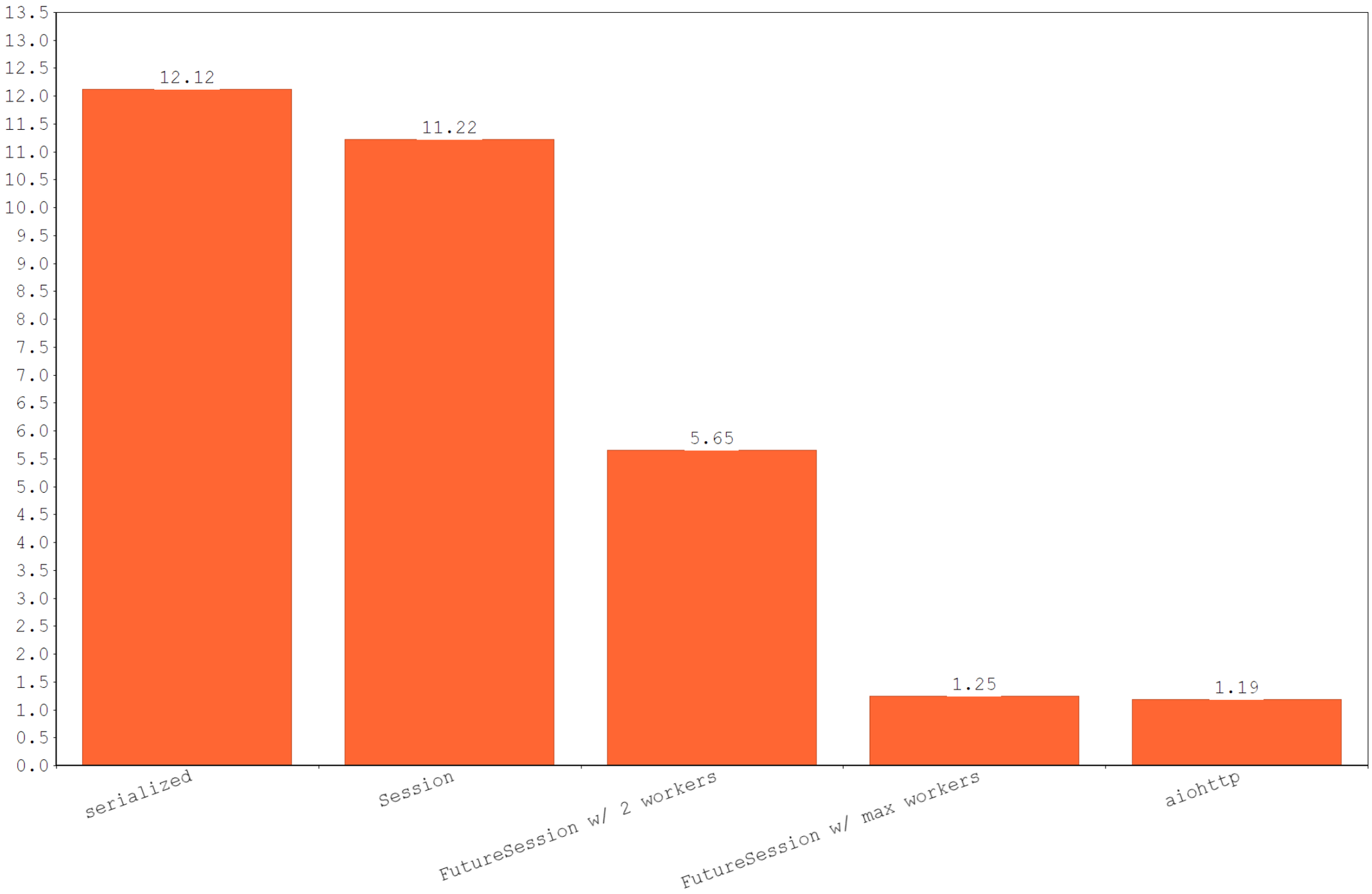


- Asynchronous, sends requests in series but without waiting for the first reply to come back before sending the new one
- Aiohttp, asynchronous http client/server framework, sends the requests over multiple connections in parallel
- Only one thread, does not have GIL issue

https://docs.aiohttp.org/en/stable/

PERFORMANCE

Sending requests to httpbin.org, an HTTP API that provides an endpoint simulating a long request



https://julien.danjou.info/python-and-fast-http-clients/

PROGRESS

- Have implemented the code
- Due to the current collecting script is still running and BMCs may not work well to handle concurrent requests, many failed requests even using retries
- Arrange a time for further testing

QUESTIONS?/COMMENTS?