High Performance Computing Systems Tools, Visualization, and Management

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Final Edge of Poster

Software Module Usage



HPC software administrators manage hundreds of software packages, or

User Monitoring and History





User Login Metrics



HPC system administrators must be aware of each user using HPC resources as well as what the users are doing with the supercomputers. This is a

modules. Some of these modules see more usage than others. Administrators need to know which ones can be removed and which ones need to be upgraded.

The Software Module Usage project is just that: a system to keep track of which modules are used and how frequently. It includes a website to visualize the information the system tracks.

Netmap

Completed Summer 2019 with Nathan Johnson.



Enhanced Hypercube Topology

Fat Tree Topology

HPC centers require very complex network systems. Each supercomputer is composed of hundreds of servers that must be able to communicate with each other efficiently. This is cause for a complicated network topology, which can be difficult to manage.

difficult task without tools designed to track users.

The User Monitoring and History (UMH) project is a system to track user sessions in the HPC enclave. With it, system administrators can easily get a good idea of "who is doing what where". Currently, it consists of a website to show current login data (including geographic user locations) as well as login data over time.

IPAM (IP Address Management)

Still in development with Dylan Gardner.

.1 .2 .3	.4 .5	.6 .7	.8	9.10	.11	.12	.13	.14	.15	.16	.17	.18	.19	.20	.21	.22
.23 .24 .25	.26 .27	.28 .29	.30 .3	.32	.33	.34	.35	.36	.37	.38	.39	.40	.41	.42	.43	.44
.45 .46 .47	.48 .49	.50 .51	.52 .5	.54	.55	.56	.57	.58	.59	.60	.61	.62	.63	.64	.65	.66
.67 .68 .69	.70 .71	.72 .73	.74 .7	.76	.77	.78	.79	.80	.81	.82	.83	.84	.85	.86	.87	.88
.89 .90 .91	.92 .93	.94 .95	.96 .9	.98	.99	.100	.101	.102	.103	.104	.105	.106	.107	.108	.109	.110
.111 .112 .113	.114 .115	.116 .117	.118 .11	19 .120	.121	.122	.123	.124	.125	.126	.127	.128	.129	.130	.131	.132
.133 .134 .135	.136 .137	.138 .139	.140 .14	41 .142	.143	.144	.145	.146	.147	.148	.149	.150	.151	.152	.153	.154
.155 .156 .157	.158 .159	.160 .161	.162 .10	63 .164	.165	.166	.167	.168	.169	.170	.171	.172	.173	.174	.175	.176
.177 .178 .179	.180 .181	.182 .183	.184 .18	85 .186	.187	.188	.189	.190	.191	.192	.193	.194	.195	.196	.197	.198
.199 .200 .201	.202 .203	.204 .205	.206 .20	.208	.209	.210	.211	.212	.213	.214	.215	.216	.217	.218	.219	.220
.221 .222 .223	.224 .225	.226 .227	.228 .22	29 .230	.231	.232	.233	.234	.235	.236	.237	.238	.239	.240	.241	.242
.243 .244 .245	.246 .247	.248 .249	.250 .25	51 .252	.253	.254										
IP Address Status View																

The extensive network systems in INL's HPC center involve hundreds of IP addresses for various servers. System administrators are tasked with keeping track of which ones are in use, which ones are free, and managing every machine on the network.

Machine Information View

The Netmap project provides a model for each supercomputer's topology including metrics through each connection, as well as a view of the physical layout of the racks of servers and their network connections.

Still in development with Bradlee Rothwell.

The IPAM project provides an easy way for system administrators to view and manage any IP address inside HPC's network. They can easily associate IP addresses with hostnames, check the history of that IP address, view the open ports on that server, and see other useful information.

Completed Fall 2019 through Winter 2020 with Bradlee Rothwell.



GPU Metrics Utilization (%) **Current GPU Utilization**

GPU Utilization over Time

Because of the power of AI and Machine Learning in nuclear research as well as the efficiency of GPUs in these areas, INL HPC has purchased systems with large numbers of GPUs.

The GPU Metrics project provides a way to monitor important metrics associated with HPC's GPU systems. Utilization, power consumption, temperature, and memory usage are examples of metrics that are collected

		Ser	sitive Text Obfuscator							
		Obfuscate Upload								
		spenow is a username that you can't see falcon1.hpc.inl.gov is a hostname you can't see paul.spencer@inl.gov is an email address you can't see 192.168.0.1 is an ig address you can't see carf=asd9sd9fs9d8s8/234fad0s1987 is a token you can't see lemhi is a cluster you can't see	<pre>\$./obfuscator.py ~/file_to_obfusc [user_1] is a username that you ca [[hostname_1] is a hostname you can [email address 1] is an email addr</pre>	<pre>\$./obfuscator.py ~/file_to_obfuscate [user_1] is a username that you can't see [hostname_1] is a hostname you can't see [email_address_1] is an email address you can't see [ip_address_1] is an ip address you can't see [token_1] is a token you can't see [cluster_1] is a cluster you can't see</pre>						
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Cluster Names	Hostnames		paul.spencer@inl.gov	[email address 1]						
IP Addresses	Email Addresses		falcon1.hpc.inl.gov	[hostname 1]						
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spenpw -> [user_1] (1) paul.spencer@inl.gov> [email_address_1] (1) 192.168.0.1> [ip_address_1] (1)			csrf=asd9sd9fs9d8s8f234fad0sf987 spenpw	[token_1] [user_1]						

Web Obfuscation

Command Line Obfuscation

HPC centers have high quantities of sensitive data about users and datacenter specifications. When sharing logs or other information with vendors or outside entities, it can sometimes be difficult for HPC administrators to properly filter out the sensitive information and avoid security risks.

The Sensitive Text Obfuscator is a tool that obfuscates information such as usernames, email addresses, IP addresses, hostnames, security tokens, etc.

by the GPU monitoring system. The project also includes a website that can be used to visualize this data and a history of the metrics.

It is available through a website or a command line utility.

Completed Winter 2020 with Bradlee Rothwell.

Completed Spring/Summer 2020 with Dylan Gardner.



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