Monitoring virtual machines and containers with VacMon

Vac and Vcyle are systems for managing the lifecycles of virtual machines and containers, developed for GridPP by the University of Manchester. They are now managing resources at 10 sites and in 2017 we developed VacMon to monitor usage and the health of the overall system, individual sites, and individual physical hypervisors.

Figure 1 shows the VacMon architecture. The vacd and vcycled daemons optionally send JSON messages in UDP packets to vacmond with information about what VMs and containers are running, and also system health details like memory usage. These messages are then stored in an ElasticSearch database, which can be viewed as aggregates using a web application, vacmon-cgi, as shown in Figure 2.

The web application has options to select date/time ranges, and links to higher and lower level views.

Figure 3a shows the number of processors occupied by running VMs and containers at all participating sites, broken down by site.

Figure 3b shows the number of processors occupied by different types of virtual machine ("vm") and Docker container ("dc") at one site before and after a software update.

Figure 3c shows memory and swap usage on one physical node.

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