Research Notes

# Red Hat Enterprise – IBM Summit

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| **Topic** | **Research** | **References** |
| Application Software | * Our AI software, like Distributed Deep Learning (PowerAI DDL), can teach computers to identify objects in images, understand the contents of documents, forecast demand or assess risk. As an example, we showed that using supercomputing technology, we could train a model to identify things at higher than human accuracy. Image recognition software has potential applications in a wide variety of fields – from identification of cancer in medical scans to assessing damage after a hurricane. * The computing power of a bleeding-edge machine like Summit can help train AI much faster than traditional computers. We know that having much shorter time to solution means that ultimately people have higher quality AI, can apply AI to more data types and create more solutions — because it becomes more feasible to run lots of studies.  Our research team is working not only on Summit-scale AI, but also on systems for AI in the enterprise – taking mini versions of Summit technology (the AC922 Power9 system and PowerAI software) into clients’ data centers to help them create AI on their own data. * It will provide at least 5-10X more performance on DOE (Department of Energy) applications compared to its predecessor * DOE can manage power transmission to other countries from American electricity | <https://www.omgubuntu.co.uk/2018/06/summit-supercomputer-red-hat-linux>  <https://www.ibm.com/blogs/research/2018/06/summit/> |
| Hardware | * Specs for the IBM Summit   + Application Performance 200 PF   + Number of Nodes 4,608   + Node performance 42 TF   + Memory per Node 512 GB   + DDR4 + 96 GB HBM2   + NV memory per Node 1600 GB   + Total System Memory>10 PB DDR4 + HBM2 + Non-volatile   + Processors2 IBM POWER9™ 9,216 CPUs   + 6 NVIDIA Volta™ 27,648 GPUs   + File System250 PB, 2.5 TB/s, GPFS™   + Power Consumption13 MW   + Interconnect Mellanox EDR 100G InfiniBand   + Operating System Red Hat Enterprise Linux (RHEL) version 7.4 * Interesting Facts   + A **200-petaflop** machine, Summit can perform 200 quadrillion (peta-) floating point operations per second (-flops). If every person on Earth completed one calculation per second, it would take the world population **305 days** to do what Summit can do in **1 second**.   + At over 340 tons, Summit’s cabinets, file system, and overhead infrastructure weigh more than a large commercial aircraft.   + More than 4,000 gallons of water pump through Summit's cooling system every minute, carrying away about 13 megawatts of heat.   + Occupying 5,600 sq. ft. of floor space, Summit could fill two tennis courts.   + Summit is connected by 185 miles of fiber optic cables—or the distance from Knoxville to Nashville.   + Summit’s file system can store 250 petabytes of data, or 74 years of high-definition video.   + For some AI applications, researchers can use less precise calculations than flops, potentially quadrupling Summit’s performance to exascale levels, or more than a billion billion calculations per second.   + 200 quadrillion calculations per second | <https://www.olcf.ornl.gov/summit/>  <https://www.ibm.com/it-infrastructure/power/supercomputing> |
| User Interface | * GNOME   + The default desktop environment for Red Hat Enterprise Linux based on the GTK (open-source cross-platform toolkit) + 2 graphical toolkits.   + Supreme access to productivity applications, web browsers, and KDE (software community) applications   + Supported by the Metacity window manager   + The Motif Window Manager is a stand-alone manager, in order to run, you must have the openmotif package installed * KDE   + An alternative desktop environment based on the Qt (to create GUIs) 3 graphical toolkit.   + KWIN windows manager is the default window manager for KDE   + The Motif Window Manager is a stand-alone manager, in order to run, you must have the openmotif package installed, it has the same usage for the KDE environment * Rebooting/Shutting Down   + The shutdown systems in the RedHat Linux machines creates a sense of recording in the shutdown log and communicates to users to the reasons why   + The reboot option shows your intent to other users and gives more control and is more efficient for the admin | <https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/5/html/deployment_guide/s1-x-clients>  https://serverfault.com/  questions/787144/  reboot-or-shutdown-r-now-what-restart-command-is-safer |
| Device Management | * Kernel   + Live patching for the kernel (complete operator), kpatch, is now available, which enables you to consume Critical and Important CVEs (Common Vulnerabilities and Exposures) fixes without the need to reboot your system   + The IMA/EVM (Integrity Measurements Architecture/Extended Verification Modules are one of the first functions of the computer) feature for verifying file system integrity is now supported on all architectures * Image Builder   + The Image Builder is now fully supported. Cloud images can be built for Amazon Web Services, VMware vSphere, and OpenStack   + The Image Builder can now run with SElinux in enforcing mode.   + the Image Builder functionality uses a command-line interface in the composer-cli utility, or a graphical user interface in the RHEL 7 web console from the cockpit-composer package. * Storage   + DIF/DIX is enabled or disabled at the storage device, which involves various layers up to (and including) the application. The method for activating the DIF on storage devices is device dependent.   + It is a component of the Kernel system | https://access.redhat.com/  documentation/en-us/  red\_hat\_enterprise\_linux/  7/html/ |
| Security | * Cryptography based security   + The legacy signature scheme, Public Key Cryptography Standard #1 (PKCS#1) v1.5, permits the keys to be reused for encrypting data or keys   + This makes those keys vulnerable to signature forging attacks published by Bleichenbacher   + Restricting the keys to the RSASSA-PSS algorithm makes them resilient to attacks that utilize decryption. With this update, NSS can be configured to support keys which are restricted to the RSASSA-PSS algorithm only. * Legacy Signatures   + The first specification of PKCS#1 v1.5-compatible signatures used text that could be interpreted in two different ways. The encoding of parameters that are encrypted by the signer could include an encoding of a NULL ASN.1 object or omit it   + Previous versions of Network Security Service (NSS) tried to verify signatures while allowing either encoding. With this version, NSS accepts signatures only when they correctly include the NULL object * AES-GCM Cipher   + AES-GCM ciphers were allowed in FIPS mode only in TLS. In the current version, we clarified with NIST that these ciphers can be allowed and certified in OpenSSH, as well. | <https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/7.7_release_notes/new_features#enhancement_security> |
| Network Connectivity | * New Features   + A new method of provisioning secondary servers called **Catalog Zones** has been added.   + The **Response Rate Limiting** feature can now help with mitigation of DNS amplification attacks.   + Performance of response-policy zone (RPZ) has been improved.   + A new zone file format called map has been added. Zone data stored in this format can be mapped directly into memory, which enables zones to load significantly faster.   + A new tool called delv (domain entity lookup and validation) for sending DNS queries and validating the results has been added. The tool uses the same internal resolver and validator logic as the named daemon.   + The named service now checks whether other name server processes are running before starting up   + Zone transfers now use smaller message sizes to improve message compression, which reduces network usage. * VLAN support   + With this enhancement, administrators can configure virtual LAN (VLAN) filtering on bridge interfaces in the corresponding Network Manager connection profiles. This enables administrators to define VLANs directly on bridge ports. * Supports Configuring Routing Rules   + Users must set up policy routing rules outside of NetworkManager, for example by using the dispatcher script provided by the NetworkManager-dispatcher-routing-rules package. With this update, users can now configure rules as part of a connection profile. As a result, NetworkManager adds the rules when the profile is activated and removes the rules when the profile is deactivated. | <https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/7.7_release_notes/new_features#enhancement_networking> |