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LLNL-TR-837423

Level-2 Milestone 7907: CORAL-2 EAS-3 Deployment

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Disclaimer

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Prepared by Adam Bertsch, Livermore Computing
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Section 1

Introduction

This report documents the delivery and installation of rzVernal, a CORAL-2 El Capitan early delivery system deployed on the LLNL Restricted Zone network. Early ASC program users have run codes on the machine in support of application porting for the final El Capitan system which will be deployed at LLNL in CY2023. In addition to the RZ resource, rzVernal, two similar machines, Tioga and Tenaya, have been deployed on the LLNL SRD and Collaboration Zone networks in support of application readiness for the El Capitan platform.

Section 2

EAS-3 System Architecture

The rzVernal machine is based on the HPE Cray EX hardware platform with AMD EPYC processors and AMD MI250X accelerators. The machine consists of 1 partial compute rack, 1 infrastructure rack, and a cooling distribution unit. The compute rack has 40 compute nodes as well as the associated HPE Slingshot switch hardware. The infrastructure rack contains core Slingshot and Ethernet switch hardware and non-compute nodes.

Compute nodes contain 1 AMD EPYC processor with 64 cores and 4 AMD Instinct MI250X GPU accelerators. The EPYC processors and GPUs are connected via AMD Infinity Fabric (xGMI) to provide high bandwidth transfers between system memory and GPU memory. The nodes are equipped with 512GB of DRAM system memory and each GPU has 64GB of High Bandwidth Memory (HBM2e).

The rzVernal system architecture maps very well on to the planned El Capitan system architecture which will contain next generation AMD MI300 APU processors which combine CPU and GPU resources as well as HBM in a single package.

System software for the EAS-3 systems consists of the LLNL-developed Tri Lab Operating System Stack version 4. The use of TOSS 4 on EAS-3 and El Capitan will provide significant benefit to both compute center staff and users due to the commonality of software experience between familiar commodity technology systems and the El Capitan advanced technology system.

Section 3

Installation Timeline

The rzVernal system was delivered to the B453 facility in February 2022. rzVernal underwent integration and acceptance testing along with the other El Capitan EAS-3 systems during March and April. Porting and testing of ASC codes began in May 2022, building on previous work that utilized the EAS-2 resources.

- Delivery 2/22/2022
- Integration Complete 3/25/2022
- Acceptance 4/29/2022
- Limited Availability 5/2/2022
- L2 Milestone 7907 Complete 6/28/2022

Appendix A

Certification Letter

TO: LLNL ASC Office

FROM: Brian S. T. Ryujin

SUBJECT: Completion of LLNL ASC Level 2 Milestone 7907

As an end user of the El Capitan early access system (rzVernal and Tenaya), I certify that the Ares code ran successfully on the El Capitan early access system to satisfy in part the requirements of the LLNL ASC Level 2 Milestone 7907, "CORAL-2 EAS-3 Deployment ".

During the install and integration phase of the El Capitan early access system, the Ares code was ported to the AMD Trento/MI250X platform and run on the machine on both the RZ and SCF networks. The Ares code successfully ran its standard set of GPU test problems, including a 3D Sedov problem, a radiation test problem and an ICF related test problem. A strong scaling study on a standardized triple point problem that was previously used to compare WSC codes in a 2021 L2 milestone, ranging from 1 to 16 nodes was also performed. In addition, a representative user hydrodynamics problem was successfully run on 8 and 16 nodes on the architecture, achieving a 2x speedup over the same number of nodes on Sierra. This performance is in line with what the code team expectations with the most up to date hardware and software available for the machine.

The details of the efforts to install the El Capitan early access machine are documented in "Level 2 Milestone 7907: CORAL-2 EAS-3 Deployment" report.

Date signed:

06/28/2022

Brian S. T. Ryujin

Computer Scientist

Appendix B

Milestone Description

Milestone (7907): CORAL-2 EAS-3 Deployment		
Level: 2	**Fiscal Year**: FY22	**DOE Area/Campaign**: ASC
Completion Date: 6/30/2022		
ASC nWBS Subprogram: FOUS		
Participating Sites: LLNL		
Participating Programs/Campaigns: ASC		
Description: Deploy a CORAL-2 EAS-3 early access system at LLNL and demonstrate utilization by initial users running a code of interest to the ASC program.		
Completion Criteria: An early user successfully runs a code on the CORAL-2 EAS-3 system installed at LLNL.		
Customer: ASC El Capitan EAS-3 users.		
Milestone Certification Method: Professional documentation, such as a report or a set of viewgraphs with a written summary, is prepared as a record of milestone completion. The “handoff” of the developed capability (product) to a nuclear weapons stockpile customer is documented.		
Supporting Resources: CSSE, IC, ATDM		