HPS
https://hps.vi4io.org

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The Virtual Institute for I/O

Introduction

Goals of the Virtual Institute for I/O

- Provide a platform for I/O enthusiasts for exchanging information
  - The organization uses a wiki as central hub
  - Supported by mailing lists
- Foster training and collaboration in the field of high-performance I/O
  - Collaboration with the HPC Certification Forum (`hpc-certification.org`)
- Track and encourage the deployment of large storage systems
  - Hosting information about high-performance storage systems
  - Supporting the IO-500 and the Data Center List

`https://www.vi4io.org`

Outline

Comprehensive Data Center List (CDCL)

The CDCL contains system characteristics for sites, supercomputer and storage

System Model

- Based on an extensible JSON schema, optimized editor
- Supports now (all) logical components and subcomponents
- Characteristics and peak values
- Measured values *-500

Components with characteristics

- Site, supercomputer, online storage, tape archives
- Compute nodes, storage nodes, local storage, accelerators, ...
- Supporting: e.g., CPU type, memory available, costs, ...

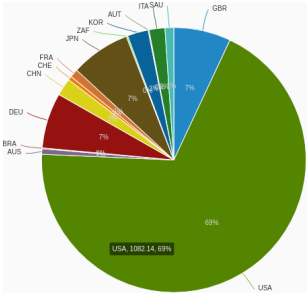
CDCL Storage List 2021: 57 Sites

Features

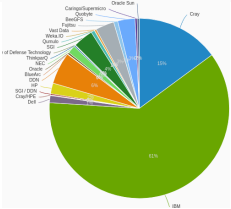
- Table view with selectable columns
- Flexible metrics and aggregation

#	site.institution	site.storage system.net capacity	site.supercomputer.compute peak	site.supercomputer.memory capacity
		in PiB	*in PFLOPS*	*in TB*
1	National Energy Research Scientific Computing Center	475.55	35.14	473.15
2	Oak Ridge National Laboratory	278.00	220.64	3511.66
3	Rutherford Appleton Laboratory STFC	81.00	0.00	0.00
4	Los Alamos National Laboratory	72.83	11.08	2110.00
5	German Climate Computing Center	52.00	3.69	683.60
6	Lawrence Livermore National Laboratory	48.85	20.10	1500.00
7	RIKEN Advanced Institute for Computational Science	39.77	10.62	1250.00
8	National Center for Atmospheric Research	37.00	5.33	202.75
9	National Center for Supercomputing Applications	27.60	13.40	1649.27
10	Global Scientific Information and Computing Center	25.84	17.89	275.98

53	NVIDIA	0.00	0.00	15.00
54	Pengcheng Laboratory	0.00	0.00	0.00
55	Joint Supercomputer Center of the Russian Academy of Sciences	0.00	0.56	28.66
56	Peter the Great Saint Petersburg Polytechnic University	0.00	1.02	50.88
57	University of Florida	0.00	0.00	0.00



Capacity grouped by country



Capacity grouped by vendor

Relevant Features

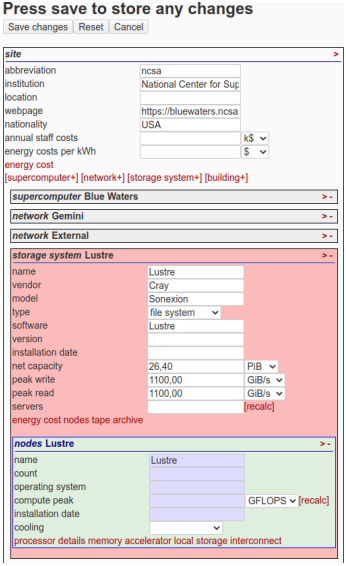
Webpage integration

- Provide a HTML stub for embedding into any data center web page
  - ⇒ Toward a **standardized presentation** of systems!
  - Allowing the site to describe and visualize their system
  - Can be hosted by a site directly
  - Allowing a simple export into VI4IO data center list
- Editor: `https://www.vi4io.org/hpsl/addpage`

Simple usage for VI4IO hosted information

- Create wiki stubs for a data center/storage system:
  `https://www.vi4io.org/cdcl-add`
- Edit the page, save

Editor



- Flexible schema (updated as needed)
  - Recursive component model
- Users may add (optional) components
- Compute information
  - e.g., two types of nodes, compute total memory
- Keep "model" data in database (to be extended)
- May also draw relation between components

Outline

The Comprehensive Data Center List & The IO500

- Provide storage-system specific schemas for IO500
  - Use language common to the storage/file system
  - For Lustre, allow to input details for OSTs, MDTs, +configuration flags
- Define rules and automatically compute comparable quantities
  - e.g., capacitiy, storage interface
- Capture production-relevant settings as well
- First version had been rolled out for the IO500
  - We need your/vendor help to create most-approriate schema!
  - We need to provide better documentation
- First tools to automatically populate schemas have been created
- Integration into CDCL is planned
  - Users can submit CDCL schema for an IO500 submission defining their system

The Journal of High-Performance Storage (ISSN 2748-7814)

Features

- Open reviews, i.e., anyone can provide feedback
- Living papers, i.e., can improve over time
- Digital replicability (of analysis/experiments)
- Free open access

https://jhps.vi4io.org

Tested approach/tools successfully

- LaTeX and GoogleDoc workflows
- First issue published on 2021-01-29
- Two papers in the incubator will be published soon

Other Activities

Supporting IO Benchmarking

- Evolving the IO benchmarks in HPC/IOR further
  - E.g., added md-workbench lately
  - Documentation ...
  - Testing using the IO500
  - Deploying performance regression with Jenkins
- Supporting users to run/discuss IO benchmarks

Next Generation IO Interfaces

- Goal: create a community forum to discuss next generation API
- Must revitalize past approach...

Everyone is welcome to participate