Research Computing Infrastructure at UF

Erik Deumens

UF Research Computing

Office of IT

Contents

- What is research computing?
- UF Research Computing Services
- Matching Program 2012
- Eastside Campus Data Center
- SSERCA and FLR

What is research computing?

- computing and data management activities related to research
- including, but not limited to
  - high-performance computing (HPC)
    - parallel computing (GPU and MPI)
  - high-throughput computing (HTC)
  - collection, management, searching, mining of large sets of data (BIGDATA)

UF Research Computing

- UFRC is an organization in the Office of IT
  - UF HPC Center is a core facility
    - http://www.hpc.ufl.edu
- UFRC mission:
  - Support research computing at UF
  - Make researchers at UF more competitive
    - in getting ground breaking results, and
    - grants

UFRC mission

- Provide high-quality infrastructure for
  - Grant-funded research
  - Scholarly research
  - Interdisciplinary collaborations
- Provide expertise
  - One place to go for research computing help
  - UFRC provides services, or
  - takes you to the appropriate service provider

UFRC resources: people

- 6 full time staff
  - 5 PhD scientist
  - 1 senior computer systems expert
- Part time staff (.25 FTE)
  - PhD scientist in charge of training program

UFRC resources: expertise

- Performance analysis & tuning
- Software engineering & code review
- Algorithm development & implementation
- Training & workshops

UFRC resources: systems

- 3 machine rooms
- Campus Research Network
- Clusters with over 6,300 compute cores
- About 1.5 PetaByte of storage

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Project planning

- Plan to use UF Research Computing services so that
  - Researchers can focus on science, engineering, and scholarship
  - Graduate students can focus on their work and degree
    - System administration is a separate profession
    - Part-time system administration is inefficient for all

UFRC services list

- Buy a piece of functional infrastructure
  - Compute core capacity
    - $400 per NCU (Normalized Compute Unit)
    - One fully equipped compute core for 5 years
  - Compute GPU capacity
    - $3,200 per NGU (Normalized GPU Unit)
    - Includes one $400 NCU, a core to control the GPU
    - Also for 5 years

UFRC services list

- Buy a piece of functional infrastructure
  - Storage capacity
    - $125 per LSU (Longterm Storage Unit)
    - $250 per RSU (Replicated Storage Unit)
    - 1 TB for 1 year
  - Use OCO funds, no overhead is charged

UFRC services list

- Buy compute and storage services
  - Cloud computing prices:
    - Compute: $0.02 per hour
    - Scratch storage: 1 TB is free
    - Longterm storage: prorated $125 per TB per year
    - Replicated storage: prorated $250 per Tb per year
  - Monthly expense charges, overhead is charged

UFRC services list

- Buy consulting services
  - Add expertise to your team at $20 per hour
  - Use OPS funds, overhead is charged
  - Small consulting projects are free

UFRC service list …

- We are open to identify, explore, and implement new services that are needed
  - Contact us for discussion

Using the UF HPC Center

- Using compute and storage resources
  - Every faculty member at UF
    - Can get a free account for self and collaborators
    - Caveat: low priority and limits apply
  - Faculty can buy services to get priority
    - Buyers get first access to idle cycles
    - Goal: suit all research needs and restrictions
  - Center provides application support

Additions fall 2011

- Dedicated node with 512 GB RAM
  - Large memory jobs
- Scratch parallel file system (Lustre) expanded to 230 TB
- 192 core test cluster for Galaxy
  - Computational biology support

Additions winter 2012

- Test cluster with 16 NVIDIA GPUs M2090 Fermi
- Two 100 TB NAS systems (Nexenta) support the long term storage services
- 1,088 core Ethernet cluster for HTC
- 512 core cluster dedicated to MPI
  - parallel jobs needing more than 32 cores

Additions coming summer 2012

- Another cluster with 1,088 cores for HTC
  - then expand MPI cluster
- Cluster with 32 NVIDIA GPUs M2090 Fermi
- Computational Biology Cluster
  - funded with help from Matching Program 2011

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Research Computing Matching

- Matching program for 2012
  - April 1 through July 30, 2012
  - Faculty already bought
  - Invest in buying a piece of infrastructure for your research group
  - UFRC matches every $ you invest
    - Double your buying power

Program terms and conditions

- Must be UF faculty member
- Buy compute capacity (NCU) or (NGU)
  - Commit to a minimum of $3,200 to be eligible
  - Shared ownership of compute resource
    - Includes nodes, RAM, network, scratch disk storage
- Buy long term storage capacity
  - Single copy (LSU) or replicated (RSU)

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Eastside Campus Data Center

- Watch the construction site
  - http://128.227.254.158/appletvid.html
- Target date for full operation
  - February 1, 2013
- New HPC Center equipment will be installed there
- Very few old systems will move

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SSERCA and FLR

- Sunshine State Education and Research Computing Alliance
  - FSU, UCF, UF, UM, USF members
  - FAMU affiliate, 4 more coming
  - Runs on top of Florida Lambda Rail
- Cyberinfrastructure to support collaboration

Foundation for collaboration

- Example: Seasonal climate prediction
  - Global climate modeling at FSU and UM
  - Generate 100 TB at TACC for long-term analysis; storage replicated at three places
  - Active climate work on 10 TB by FSU and UM
  - Active cop modeling on 10 TB by UF
- SSERCA makes it work for you!

Who you gonna call?

~~Ghostbusters!~~

UFRC

UF Research Computing

- Website: http://www.hpc.ufl.edu
- Director:
  - Erik Deumens deumens@ufl.edu
- Associate director:
  - Charles Taylor taylor@hpc.ufl.edu

Research Computing Advisory Committee

- Website: http://www.it.ufl.edu/governance/advisorycommittees/researchcomputing.html
- Chair:
  - Paul Avery avery@phys.ufl.edu
- Subcommittees:
  - HPC Committee (since 2005)
  - DLC (Data LifeCycle) committee (since 2011)

Tell us what you need…

- A plan is being developed
- Priorities are being explored
- Tell us what your needs are
  - so that we may address them, or
  - can plan for addressing them in the near future

We want to hear from you!