

CSCI-B 649: Science Gateway Architectures

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Todays Outline

- Class Logistics
- Motivation & Goals
- Course Overview
- Science Gateways & Apache Airavata
- A glimpse about Projects



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Class Introductions

Share your goals, expectations, concerns and a brief background



Key changes from Spring 2016

- Associate Instructors
 - Anuj Bhandar, Ajinkya Dhamnaskar, Abhijit Karanjkar, Mangirish Wagle
- Project Changes
 - milestones reversed.
 - make up 90% of the grade.
 - each individual team members will be graded separately.
 - Project deadlines strictly enforced.



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Little bit about us

- Pervasive Technology Research Centers
 - Center for Applied Cybersecurity Research (CACR) leads the secure applications in critical areas of cyberinfrastructure. Lead by **Von Welch**.
 - Data to Insight Center (D2I) focuses on the life cycle of digital data. Lead by **Beth Plale**.
 - Digital Science Center (DSC) advances cloud computing and network science. Lead by **Geoffrey Fox**.
 - Science Gateways Research Center (in process will be announced in September). Will be lead by **Marlon Pierce** and **Suresh Marru**.



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Class Objectives

- Provide a high level, broad understanding of the application of core distributed computing systems concepts.
- Study both abstract concepts and practical techniques.
- Understanding state of the art and apply the general concepts of Distributed Systems in developing a science gateway.
- Open source philosophies modelled after Apache Software Foundation.



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Distributed Systems

- Multiple Definitions.
- “A distributed system is a collection of entities, each of which is autonomous, programmable, asynchronous and failure-prone, and which communicate through an unreliable communication medium.” - Prof. Indranil Gupta, UIUC



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Data Centers & Supercomputers are Distributed Systems too



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This will not be a Hardware Centric Course

Example: The Open Compute Project (OCP) is reimagining hardware, making it more efficient, flexible, and scalable.



OPEN
Compute Project



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Brainstorm a “software as a service” case study

Pick an example which you cannot live with being offline





Source: https://www.facebook.com/note.php?note_id=469716398919



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Common Distributed Characteristics

- Heterogeneity
- Robustness
- Availability
- Transparency
- Concurrency
- Efficiency
- Scalability
- Security
- Openness



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Course Outcomes

- Understanding of microservice architectures and their underlying distributed systems foundations.
 - Componentization & Containerization.
 - Scalability & Resilience
 - Monitoring & Analytics
- Applied understanding of the DevOps principles of continuous integration and delivery to the development and operations.
- Understanding of open source practices, particularly those of the Apache Software Foundation.
- Understanding of Science Gateways.



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Course Projects

- There will be 4 project milestones, each one is worth 20 points.
 - Project Milestone 1: Microservices with DevOps
 - Due September 22
 - Project Milestone 2: Security, Auditing, Distributed Coordination
 - Due October 20
 - Project Milestone 3: Reliability & Scaling
 - Due November 17
 - Project Milestone 4: Cyberinfrastructure
 - Due December 8
- Mid-term and finals are project demonstrations, each one worth 5 points.



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Thank You!

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