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CSCI-B 649
Science Gateway Architectures

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Todays Outline

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

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Class Introductions

Share your goals, expectations, concerns and a brief background

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Key changes from Spring 2016

- Associate Instructors
  - Names are being confirmed.
  - AI office hours in addition to instructor office hours.
- Project milestones reversed.
- Project make up 90% of the grade.
- Each individual team members will be graded separately.
- Project deadlines strictly enforced.
- No curving.

Who we are

- Pervasive Technology Institute Research Centers
  - Center for Applied Cybersecurity Research (CACR) leads the creation of IT security policy, security tools, and 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.
  - Center for Advanced Cyber-Enabled Environments (in process will be announced in September). Will be lead by Marlon Pierce and Suresh Marru.

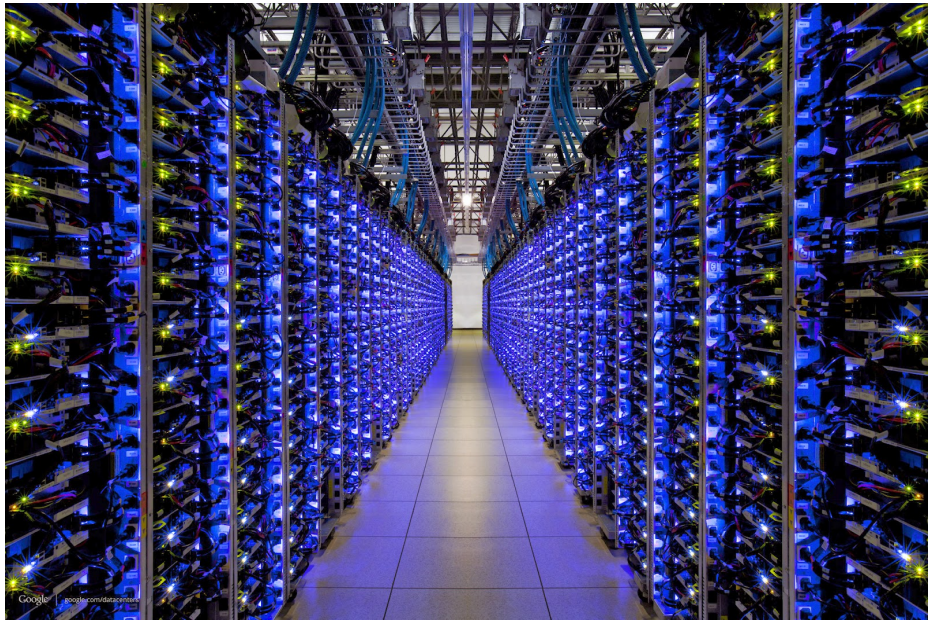
Class Objectives

- 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.

Distributed Systems

"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



Data Centers

What we will not cover – Hardware

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

OPEN
Compute Project

Brainstorm a case study

Pick a “Software as a Service” example which you cannot live with being offline

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

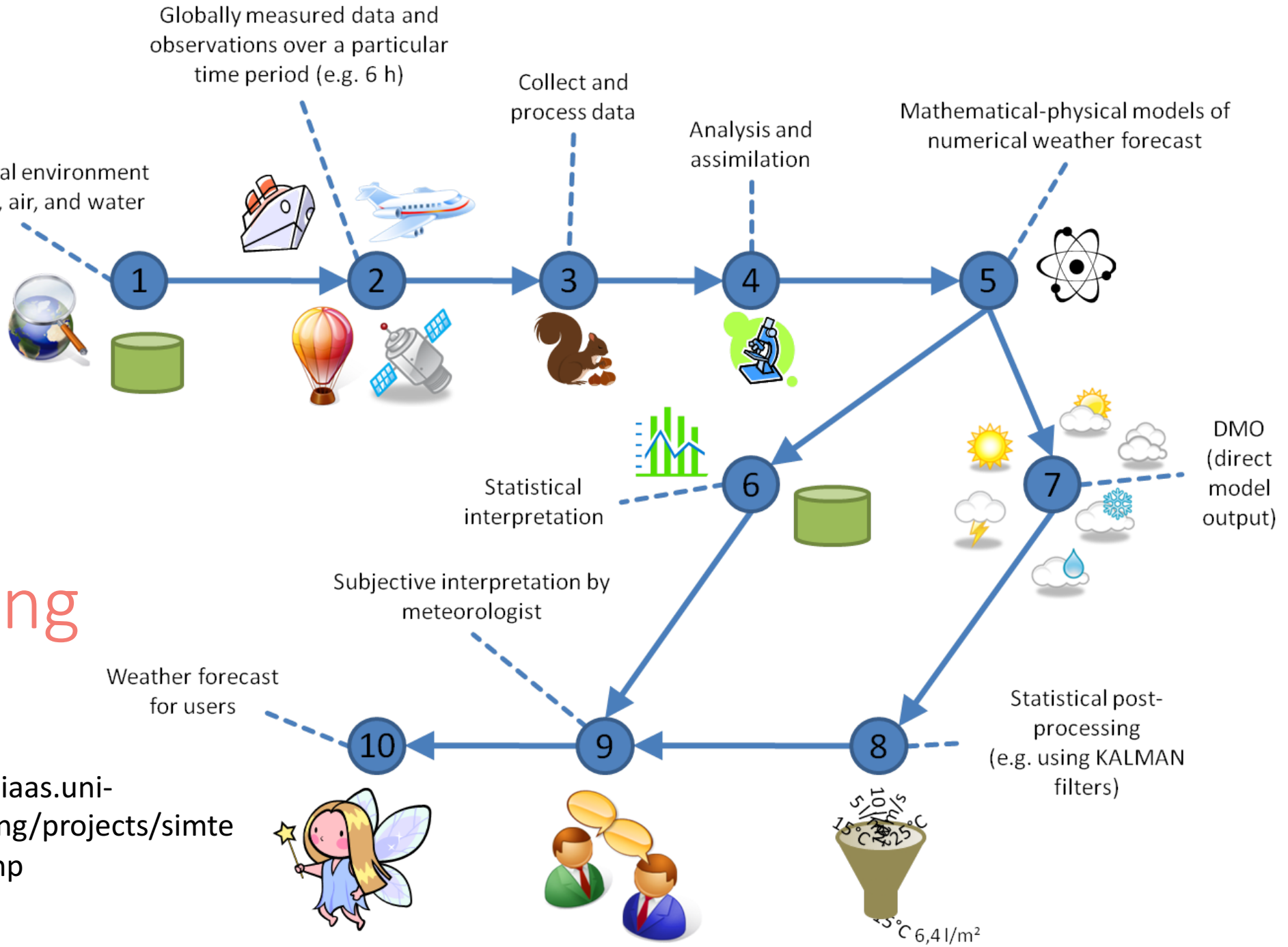
Common Distributed Characteristics

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

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.

Weather Forecasting



Source: http://www.iaas.uni-stuttgart.de/forschung/projects/simtech/sim-workflows.php

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.

Advance Track

Should be able to all of basic track + more

Volunteers?

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