NSF EPSCoR
Nevada Infrastructure for Climate Change, Education & Outreach
ERTAB Meeting

Cyberinfrastructure Component

Sergiu Dascalu & CI Team

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Outline

- Introduction
- Year 2 Review
- Challenges & Changes
- Year 3 Activities

Introduction: CI Goal

- Goal:

  Facilitate and support interdisciplinary climate change (CC) research, policy, decision-making, outreach and education by using cyberinfrastructure (CI) to develop and make available integrated data repositories and intelligent, user-friendly software solutions

Introduction: Outputs and Outcomes

- Outputs:
  - Nevada Climate Change Data Portal
  - Software tools for climate change research, outreach and education: Software Frameworks
  - Integration and interaction across project and among CI groups within the 3-State Western Consortium: Facilitator of Collaboration
- Outcomes:
  - Strengthened CI for CC research, education, outreach
  - Increased public awareness of CC science through access to data
  - State and regional collaborations on CC
  - Widespread dissemination of CC software tools
  - Nationally recognized research in CI

Introduction: Major Activities

- Major activities included in the 5-year strategic plan:

  […]

  - Years 2-3
    - Build, test, and run data portal
    - Research and develop software frameworks
    - 

      Contribute to the development of the data access and sharing policy
  - Years 4-5
    - Run data portal
    - Extend data portal for school/business use
    - Apply software frameworks for appropriate components

Year 2 Review: Personnel

- 3 Faculty:
  - Sergiu Dascalu (UNR)
  - Fred Harris (UNR)
  - Shahram Latifi (UNLV)
- 2 Software developers [hired October 2009]:
  - Michael McMahon (UNR) – data portal
  - Eric Fritzinger (UNR) – software frameworks (web services)
- 3 Graduate students:
  - Sohei Okamoto (UNR) – PhD student, software frameworks (DSL-based)
  - Victor Ivanov (UNR) – MS student, data portal
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Ershad Sharifahmadian (UNLV) – PhD student, data portal [since August 2010]
- 1 Undergraduate student [March-April 2010]:
  - 

James Arthur (UNR) - data portal

Year 2 Review: Developments

Data Portal Stages

1 Establish initial collaborations

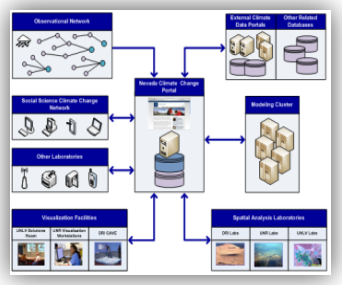
2 Define architecture

3 Build infrastructure

4 Collect raw data

5 Develop portal interface

1



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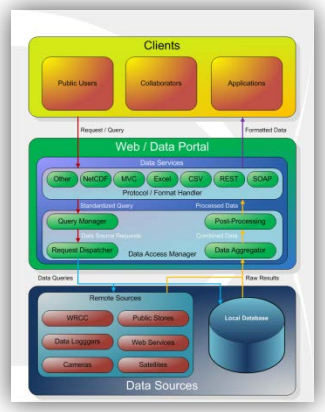

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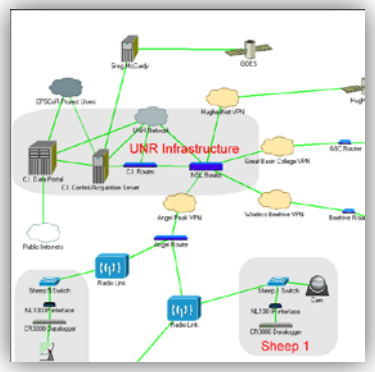

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Year 2 Review: Developments

Data Portal Versions

Alpha version (October 2010); 20 users α

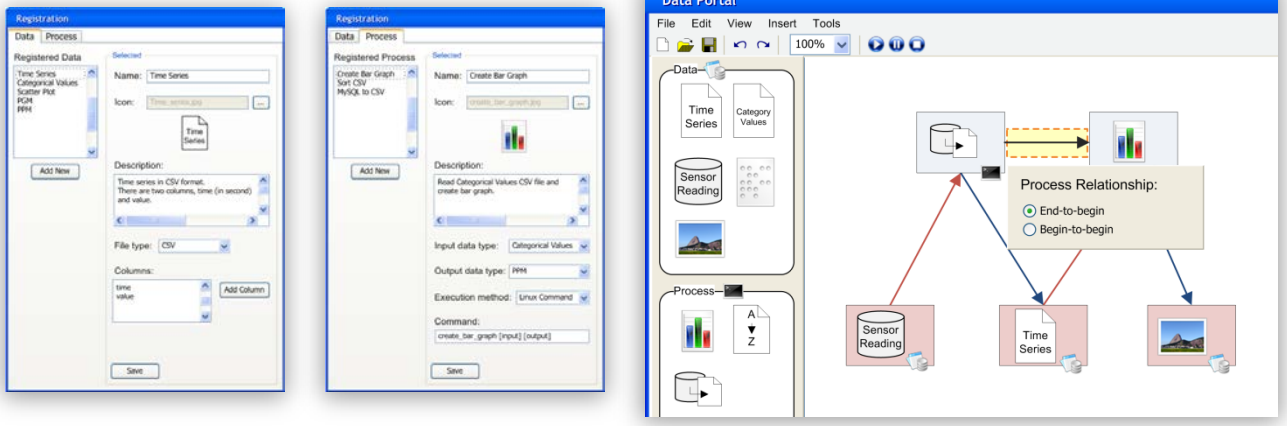
α' Revised alpha (December 2010); 40 users

Beta version ongoing; 100+ users β

Year 2 Review: Developments

Software Framework Development: Stage 1

- The framework began as a visual programming environment
- The user would program the low-level interaction between the models using the GUI



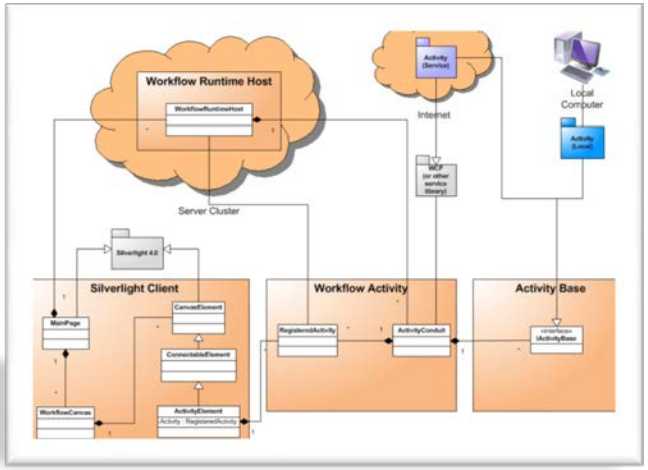
Stage 1 — Stage 2 — Stage 3 — Future

Year 2 Review: Developments

Software Framework

Development: Stage 2

- The framework was changed to use the Silverlight framework for a platform independent, web-based user interface where the user could define workflows for model coupling
- It evolved further to utilize the growing number of web services being exposed to the world

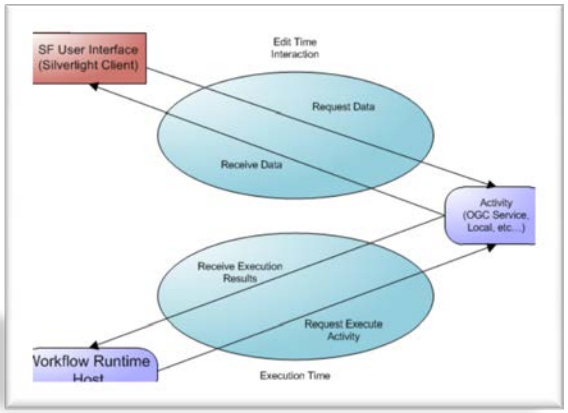


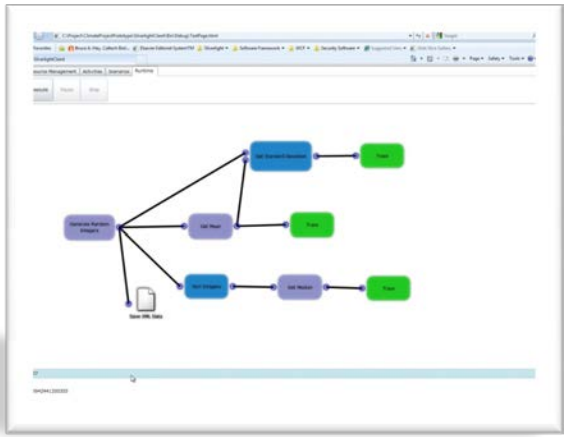
Year 2 Review: Developments

Software Framework

Development: Stage 3

- The framework development is now focused on data consolidation, conversion, and utilization
- The runtime is capable of executing defined workflows, but is not accessible as a web service yet
- The framework has the ability to read/write NetCDF files
- The framework can access Web Feature Services and retrieve data, though the GUI for this is still in development





Stage 1 — Stage 2 — Stage 3 — Future

Year 2 Review: Developments

- Professional Developments
  - Software development professionals (Mike and Eric)
    - Attended 2* international conferences
    - Attended 3 professional development conferences or workshops
    - Successfully took 4 certification exams
    - Attended 6 project and Tri-State Consortium events
  - Graduate students (Sohei, Victor, Ershad)
    - Attended 5 international conferences
    - Attended 4 project and 3-State Consortium events
  - Faculty members (Sergiu, Fred, Shahram)
    - Attended 5 international conferences
    - Attended over 15 project and 3-State Consortium events

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* Total number of participations within the subgroup

Year 2 Review: Collaborations

- Collaborations within the project:
  - Joint hands-on work (e.g., setting up data communication networks, and portal interface development)
  - Project meetings
  - Project workshops
  - Joint grant proposals
  - Additional “spin-off” projects funded
  - Co-advisement of students
  - Collaborative tools (teleconferences, skype, telephone, emails)
- In order to build and expand the data portal it is vital that input is supplied by all project components

Year 2 Review: Collaborations

- Collaboration with Tri-State Consortium partners:
  - Regular teleconferences part of the NSF Track II project on CI
  - Two 2010 Innovative Working Group (IWG) projects
  - Four joint workshops related to the IWG projects (held, respectively, in NV, NM, ID, and CA)
  - Joint grants proposal activities
  - Participation to international conferences
  - Joint organization of special sessions and workshops at the Tri-State Conference
  - Invited research seminar talks

Year 2 Review: Research

- Research results
  - 3 peer-reviewed conference papers
    - ISSNIP-2010, Brisbane, Australia
    - IEEE WAC-2010, Kobe, Japan
    - IEEE CADS-2010, Tehran, Iran
  - 1 abstract-based conference paper
    - ESCO-2010, Pilsen, Czech Republic
  - 3 invited seminar talks
    - University of Alabama, Tuscaloosa
    - IEEE Section, Oklahoma City, OK
    - Glyndwr University, Wales

Year 2 Review: Research

- Research results [continued]
  - 7 graduate posters presented by our graduate students at 4 events
  - 2 NSF NV EPSCoR undergrad research projects funded
  - 2 IWG projects funded (collaborations with Idaho and New Mexico)
  - 3 related NSF proposals submitted (2 declined, 1 pending)
- Other
  - Okamoto: Passed his PhD comprehensive exam in August 2010
  - Ivanov: Getting closer to finishing his Master's degree in CS
  - Harris: Best Paper Award CAINE-2009, Honolulu, HI
  - Dascalu: Runner-up, UNR 2010 Distinguished Teacher Award
  - Harris and Dascalu: part of a joint UNLV-UNR project team ("Losing the Lake") led by M. Nussbaum (UNLV), recipient of a UNLV College of Education Collaboration Group Award

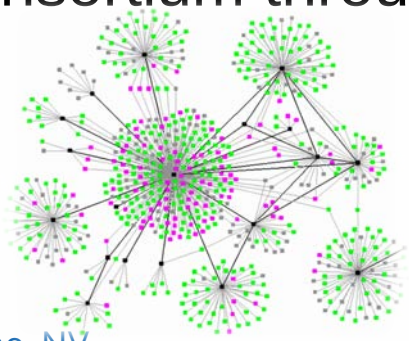
Changes and Challenges

- Changes
  - There are no major changes to the original 5-year strategic plan
  - Additions:
    - Coordinate with Track II developments on data archives and model interoperability [Ongoing activities]
    - Contribute to the development of the data access and sharing policy [Activities Year 3]
- Challenges
  - Defining and implementing the project's data policy (together with all other project groups)
  - Establishing a systematic process for data portal operation and extension through participation from all other project groups
  - Achieving high usability and usage for the data portal & its related software tools
  - Ensuring the sustainability of the data portal

Year 3 Activities

Data Portal

- Constantly enrich data portal contents and interface
- Continue activities in Stage 6 [Advanced Data Services]
  - Implement database for raw data import, asset tracking, metadata, geospatial searches, individual measurement searches
  - Implement QA and QC measures
  - Import and integrate external data sources (e.g., WRCC)
  - Implement export/formatting options
- Increase collaboration with Tri-State Consortium through:
  - Metadata exchange
  - Data synchronization and replication



Year 3 Activities

Data Portal [continued]

- Research and develop new software tools for:
  - Web services access
  - Survey management/user feedback
  - Data portal access on mobile devices
  - Optimal data transmission (using a cognitive system)
- Implement accessibility features
- Work on defining systematic procedures for data curation through templates and controlled vocabularies
- Make the portal available to the general public and build/increase the portal's user base

Year 3 Activities

Software Frameworks

- The Demeter Environment (Fritzinger)
  - Complete Web Feature Service access
  - Access Web Coverage Services
  - Access Web Processing Services
  - Improve graphical user interface
  - Implement runtime optimizations
  - Implement execution scenarios
- The DSL-based Environment (Okamoto)
  - Finalize prototype
  - Complete case studies
  - Defend PhD dissertation