CCA
Common Component Architecture

Welcome to the
Common Component Architecture
Tutorial

Eugene, OR

July 9, 2003

CCA Forum Tutorial Working Group
http://www.cca-forum.org/tutorials/
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JPL · Lawrence Livermore National Laboratory · Los Alamos NATIONAL LABORATORY · NORTHROP GRUMMAN Information Technology · ornl OAK RIDGE NATIONAL LABORATORY · Sandia National Laboratories · UNIVERSITY OF OREGON

Who Are We?
(And Where Did We Come From?)

- ACTS Toolkit Interoperability Effort (Late 1990's)
  - Part of DOE 2000, Many Tool Integration Projects
    - "One-to-One", Leading to N^2 Solutions… ☹
- Common Component Architecture Forum (1998)
  - Goal: To Develop a General Interoperability Solution
  - Grass Roots Effort to Explore High-Performance Components for Scientific Software
- SciDAC Center for Component Technology for Terascale Simulation Software (CCTTSS, 2001)
  - Part of New DOE Scientific Simulation Program
  - Technology Development in Several Thrust Areas…

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The Common Component Architecture (CCA) Forum

- Define Specifications for *High-Performance* Scientific Components & Frameworks
- Promote and Facilitate Development of Domain-Specific *"Standard" Interfaces*
- Goal: *Interoperability* between components developed by different expert teams across different institutions
- Quarterly Meetings, Open membership…

  Mailing List: *cca-forum@cca-forum.org*

  http://www.cca-forum.org/

3

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Center for Component Technology for Terascale Simulation Software (CCTTSS)

- DOE SciDAC ISIC ($16M over 5 years)
  - SciDAC = Scientific Discovery through Advanced Computing
  - ISIC = Integrated Software Infrastructure Center
- *Subset* of CCA Forum
- Develop CCA technology from current prototype stage to full production environment
- Increase understanding of how to use component architectures effectively in HPC environments
- Participants: (Funded by the Office of Mathematical, Information and Computational Sciences (MICS))

Lead PI: Rob Armstrong, SNL *<rob@sandia.gov>*

http://www.cca-forum.org/ccttss/

4

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CCTTSS Research Thrust Areas and Main Working Groups

- Scientific Components
  - Scientific Data Objects
    Lois Curfman McInnes, ANL (curfman@mcs.anl.gov)
- "MxN" Parallel Data Redistribution
    Jim Kohl, ORNL (kohlja@ornl.gov)
- Frameworks
  - Language Interoperability / Babel / SIDL
  - Component Deployment / Repository
    Gary Kumfert, LLNL (kumfert@llnl.gov)
- User Outreach
    David Bernholdt, ORNL (bernholdtde@ornl.gov)

5

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Acknowledgements

- **CCA Forum Tutorial WG**
  - Rob Armstrong, David Bernholdt, Wael Elwasif, Lori Freitag, Dan Katz, Jim Kohl, Gary Kumfert, Lois Curfman McInnes, Boyana Norris, Craig Rasmussen, Jaideep Ray, Sameer Shende, Torsten Wilde, Shujia Zhou
  - ANL, JPL, LANL, LLNL, NASA/Goddard, ORNL, SNL, U Oregon

- **And many more contributing to CCA itself…**
  - ANL - Kate Keahey, Jay Larson, Ray Loy, Lois Curfman McInnes, Boyana Norris, …
  - Indiana University - Randall Bramley, Dennis Gannon, …
  - JPL – Dan Katz, …
  - LANL - Craig Rasmussen, Matt Sotille, …
  - LLNL - Tom Epperly, Scott Kohn, Gary Kumfert, …
  - NASA/Goddard – Shujia Zhou
  - ORNL - David Bernholdt, Wael Elwasif, Jim Kohl, Torsten Wilde, …
  - PNNL - Jarek Nieplocha, Theresa Windus, …
  - SNL - Rob Armstrong, Ben Allan, Lori Freitag Diachin, Curt Janssen, Jaideep Ray, …
  - University of Oregon – Allen Maloney, Sameer Shende, …
  - University of Utah - Steve Parker, …
  - And others as well …

6

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Agenda

	Module	Presenter	Length
	Welcome and Acknowledgments	Sameer Shende	5 min
1	Introduction to Components for Scientific Computing	David Bernholdt	30 min
2	CCA Concepts	David Bernholdt	30 min
3	A Simple CCA Example	Boyana Norris & Wael Elwasif	15 min
4	Language Interoperability using Babel	Gary Kumfert	40 min
	Break (Q & A opportunity)		15 min
5	Writing CCA Components	Boyana Norris & Wael Elwasif	30 min
6	How to Create Ccaffeine Components	Boyana Norris & Wael Elwasif	30 min
7	A Look at More Complex CCA Applications	David Bernholdt	45 min
8	CCA Status and Plans	Gary Kumfert	15 min
	Q & A Session		15 min

7