

Collaborative Service Oriented Architecture Meta-computing design platform for mechanical products development— CoSOAM project

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Problem:

- In a multifunctional teamwork aimed at concurrent design, various interacting tasks may be carried out by different developers with various software tools distributed remotely in different places
- A concurrent engineering (CE) platform is needed to facilitate the communication, coordination and cooperation of the various tasks and software tools in the CE product development process in a distributed environment
- The existing commercial CE support platforms such as Product Data Management system, Workflow Management system, Process Management system, Product Lifecycle Management system, and others lack of flexibility and reliability since they do not fully consider the fact that the network is inherently a dynamic environment
- In recent years, research work on Service-Oriented Architecture (SOA) has progressed steadily from static SOA to dynamic SOA, and one of the implementation for dynamic SOA is SORCER (Service ORiented Computing EnviRonment), which is a dynamic SOA meta-computing infrastructure
- SORCER-paradigm invented by Dr. Mike Sobolewski has proven to be efficient and deserving to be put into practice all the globe round

Conclusion:

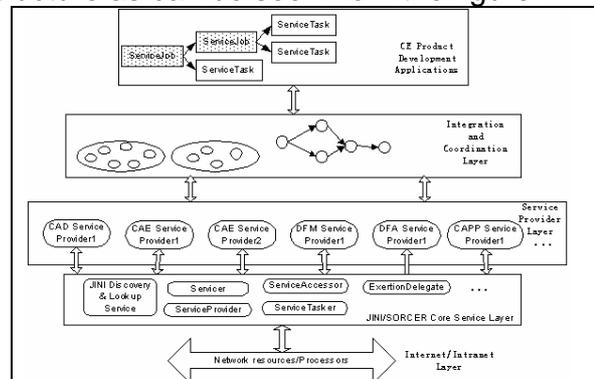
A flexible CE platform – Collaborative Service Oriented Architecture Meta-computing design platform (CoSOAM) able to integrate various software tools as loosely coupled services, which form a federation for specific computing jobs when requested, and providing reusability, scalability, reliability and efficiency for the platform, is needed.

Objective:

A CE platform should be developed to provide a distributed environment for collaborative product development spanning across several different departments in an institution (enterprise) or several institutions (enterprises).

Solution:

One of possible solutions may be a five-layer structure as can be seen from the figure:



1. The Internet/Intranet layer
2. The JINI/SORCER core service layer
3. The service provider layer
4. The integration and coordination layer
5. The CE product development layer

Approach:

- Literature Review and Study
 - Exertion-oriented (EO) programming
 - JINI/SORCER Technology
- Practise EO Meta-programming
 - In Home University
 - In Host University
- Develop a Specific Application Software Tool for Mechanical Engineering
- Wrap CAD / CAE Software Tools as Services for CoSOAM
- Develop CoSOAM methodology
- CoSOAM platform design
- CoSOAM prototype implementation
- Verification and validation of the CoSOAM platform

Schedule:

Literature Review and Study	April 2008
Practise EO Meta-programming	August 2008
Develop a Specific Application Software Tool for Mechanical Engineering	December 2008
Wrap CAD / CAE Software Tools as Services for CoSOAM	April 2009
Develop CoSOAM methodology	August 2009
CoSOAM platform design	December 2009
CoSOAM prototype implementation	April 2010
Verification and validation of the CoSOAM platform	August 2010
Project defense	December 2010

Money:

2008 –
2009 –
2010 –
Total –

Benefits:

- With the CoSOAM platform, CAD and CAE software tools can be integrated as services for CE product development projects
- Services can be distributed among different hosts to allow for reusability, scalability, reliability, and load balancing
- Service providers can be replicated and dynamically provisioned for reliability to compensate for network failures
- Service providers can be discovered dynamically in runtime by the service types they implement
- Based on exertion-oriented programming, a requestor can write exertions to invoke the CAD and CAE services in a dynamic federation without needing to know the exact location of a provider beforehand, so flexibility can be well achieved, and collaborative design in the CE projects can be implemented in the distributed dynamic environment
- Friendly and intuitive user agent for space-oriented grid computing
- SORCER-paradigm will be put into practice in one more country – Russia, for which such a project will be a significant innovation