Technical Core: Biomedical Problem Solving Environment (SCIRun/BioPSE)
Overview

Introduction

• BioPSE for computational science

Recent Progress

• LevelSetSegmentation PowerApp
• NeuroFEM bridge
• Biolmage enhancements
SCIRun and BioPSE

SCIRun: infrastructure and general functionality

BioPSE Package: functionality specific to bioelectric fields

BioPSE System: SCIRun + BioPSE Package

Center has been primary contributor to SCIRun (as required for developing user apps)
SCIRun Is…

Interactive visual programming environment for application development (dataflow)

Suite of interoperable Scientific Computing tools
- “what if?” analysis
- computational steering

Environment for rapid development of new tools (wizards)

Integrative environment for bringing tools together (bridges)

Set of high-performance libraries
- Resource management
- Math, geometry, graphics

Architecture for building end-user applications (PowerApps)
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Guiding Principles

Driven By Needs of Collaborators

Accessibility and Usability

Integration and Extensibility

Performance and Control
### Principal Collaborations

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**Research and Development**

- Development
- Applied Research
- Fundamental Research
Progress Towards Specific Aims

Accessibility and Usability
- New LevelSetSegmenter PowerApp (with docs)
- Direct painting support in BioImage
- Windows Port!

Integration and Extensibility
- Bridge to NeuroFEM
- Updated module wizard
- Client-server control mechanism

Performance and Control
- Data streaming: multi-file read/write
- Large data time-dependent vis
- Event notification mechanism for scripting
Progress: LevelSetSegmenter PowerApp

Cell Anatomy: NCMIR, UCSD

Workflow as Dataflow

Technology Bridging

Data Streaming
Progress: NeuroFEM into SCIRun

Inverse EEG: Mayo Clinic and UCSD
Progress: NeuroFEM into SCIRun

Inverse EEG: Mayo Clinic and UCSD

Bridging
- Data translators
- Direct application invocation
Progress: Client-Server Model for Remote Invocation

Tissue Simulation: Duke
Progress: Client-Server Model for Remote Invocation

Tissue Simulation: Duke

Bridging
- MPI / distributed applications
- Remote daemon client
- Communication protocol
- I/O control
- Transparent data transfer
Progress: Biolmage Enhancements

Time-Dependent CT: MGH

Time-dependent volume visualization

Direct painting enhancements
Summary of Specific Aims

Accessibility and Usability
• Targeted applications
• Interactive documentation

Integration and Extensibility
• Bridging tools
• API export
• User interface separation

Performance and Control
• SCIRun2 integration
• Increase performance
• Very large data