Extension of the SNAP Model Editor to Support the RELAP5-3D© Code

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Design Objectives

- Provide a wrap-around common engineering interface to multiple analysis codes.
- Provide a graphical view of the flow, heat and logic model network.
- Share design information from a common, controlled database.
- Provide user-friendly tools and wizards and perform on-the-fly renodalization.
- Improve consistency and quality assurance.
Wrap-around Common Engineering Environment

- PRE-PROCESSOR GUI (SNAP BASED)
- INTEGRATED CODE SYSTEM
- POST-PROCESSOR
Background

• Initial funding from the NRC to support
  – RELAP5 Mod3.3
  – TRACE (formerly TRAC-M)

• Included hydraulics, heat structures, control systems and point kinetics

• Cross-platform design
  – first written in C++ with toolkits
  – later rewritten using Java1.2
  – now Java1.4 compliant
Extensions for RELAP5-3D

- Modeling Options
  - development options
  - print control

- Multi-dimension Component
  - based on work done for the TRACE vessel
  - Cylindrical and Cartesian geometries

- Pressurizer Component

- Parametric variable names
Nodal Kinetics

- Cartesian and hexagonal geometries
- Zone and composition assignments are displayed using mesh tables.
- Supported Feedback types
  - RAMONA
  - HWR
  - GEN
Component Object Model

Physical data is entered which can then be divided into the calculation mesh.

• Containers
  – Volumes
  – Heat Slabs
  – Control Blocks

• Links
  – junctions
  – logic flow
• Geometry based on “metadata” representation
  – first extract the physical data
  – then create new code specific objects

• Model options are based (as much as possible) on physical properties and user preferences. Remainder will be supplied through user interaction.
Renodalization
Renodalization Cont.
User Interface Design
Model Editor Main Window
(typpwr model shown)
Multi-dimension Component
Nodal Kinetics
Work In Progress

• Component Grouping
  – simplify the display by allowing sets of components to be grouped as a composite
  – does not change any physical data

• Intelligent Renodalization Wizard
  – Current code can only divide 1 or more cells in a pipe into equal area cells.
  – New procedure acts on a set of connected components or the whole model.
  – Uses experience-based rules.
Conclusion

• Flexible and extensible architecture
• Provides visual representation of complex input models
• Automate repetitive tasks
  – Consistent with engineering guidelines
  – Decrease user effects