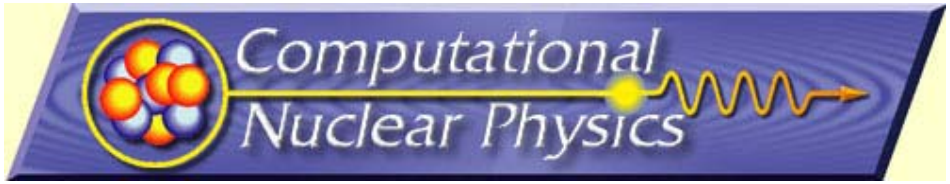
LLNL Nuclear Data Processing Codes



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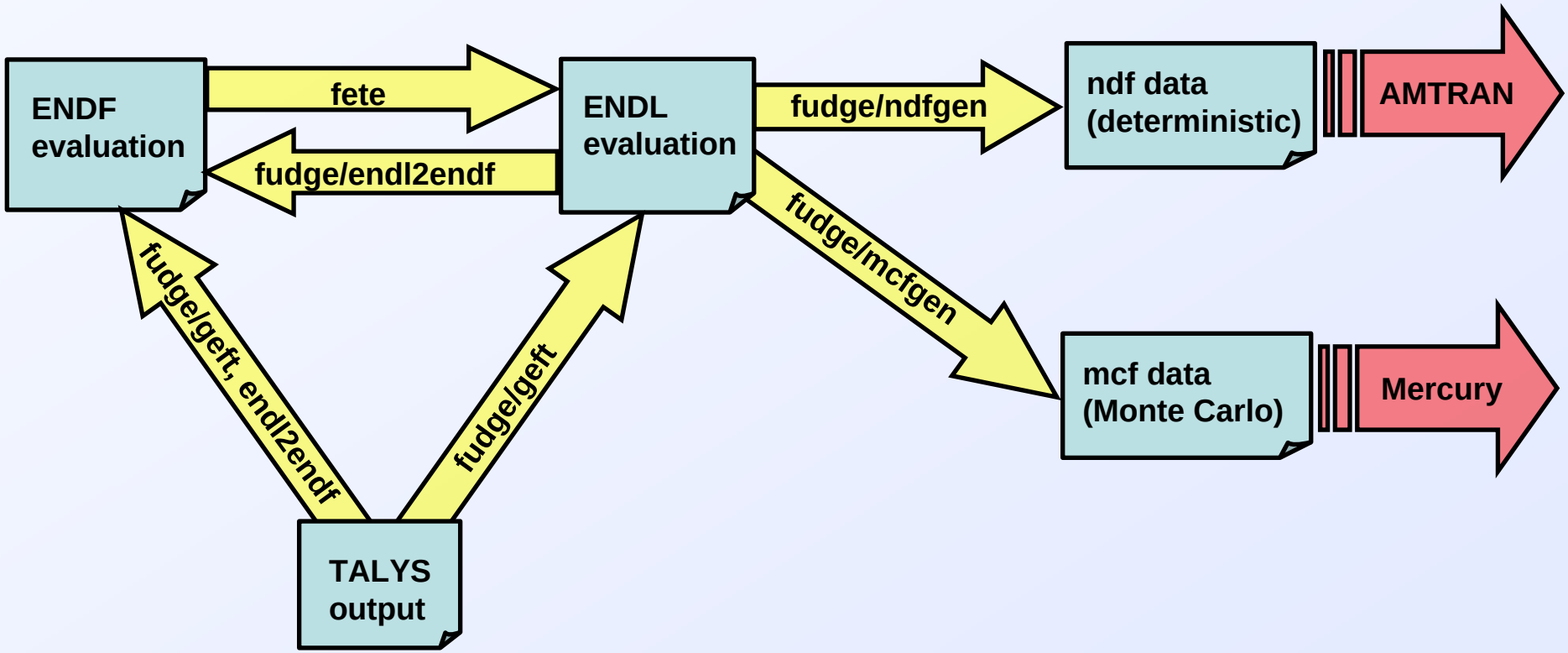
LLNL nuclear data processing system supplies Monte Carlo and deterministic transport codes



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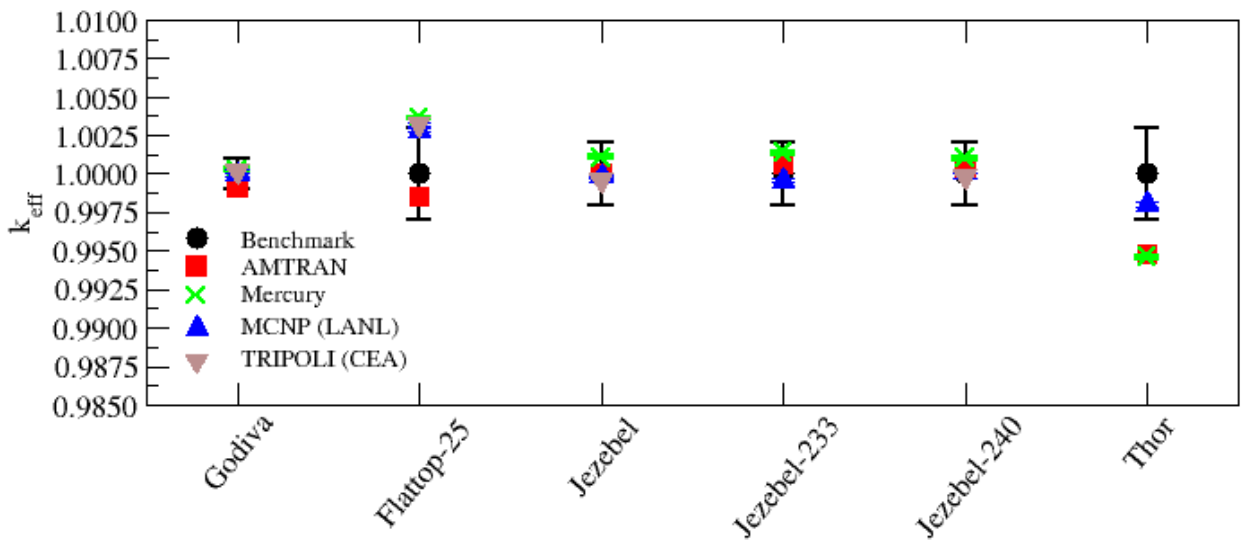
Data testing is an integral part of our data handling

- Developing comprehensive test suite and automation tools as part of ASC program Quality Assurance mandate
  - Critical assemblies: 15 currently, Monte-Carlo & deterministic
  - LLNL Pulsed spheres: 17 currently, γ & n spectra, Monte-Carlo only
  - Replacement coefficients: > 44 cases, Deterministic only
  - Various sanity tests: Monte-Carlo & deterministic
  - We will add more as time permits



We are rewriting processing codes to be more developer and user friendly, and write Structure Based (XML) output data: xProcessing

- **Deterministic processing:**
  - LLNL legacy code is ndfgen
    - Fortran with Cray pointers: problem for coding and portability
    - Fixed-size, allocated memory a problem
    - Very time consuming to debug or add new features
    - Output is ASCII which is converted to a Cray binary format.
  - New code is xndfgen
    - Mainly written in Python
    - Computationally intensive parts written in C++
    - Wrote an python code to convert xndfgen's XML output into the legacy format.
    - Have compared output to legacy code output
      - Few differences (< 3% reaction/isotope)
        - » Some legacy code bugs
        - » Working on others

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xProcessing - cont.

- **Monte Carlo processing:**
  - LLNL legacy code is mcfgen
    - Fortran with Cray pointers
    - Very time consuming to debug or add new features
    - Output is:
      - ASCII which is converted to a Cray binary format.
      - Or, a newer pdb which is not as good.
  - New code xmcfgen
    - Completely written in Python
    - Wrote an python code to convert xndfgen's XML output into the legacy ASCII format.
    - Also have a XML to ACE python converter
    - Have compared output to legacy code with good agreement

xProcessing future development

- We already have basic reader for the XML data
  - Collaborating with SLAC people to implement in GEANT
- Deterministic processing
  - Will implement all ENDF “type” data
  - Will implement support for an XML based input
  - XML output to Los Alamos NDI format converter
- Monte Carlo
  - Will implement all ENDF “type” data
  - Will implement support for an XML based input
  - XML output to pdb format converter
- Hope to have all this done this fiscal year (i.e., by Oct. 2008)
  - Release of XML format specification
  - Beta release of codes

The move to Structure Based (XML) data already is creating new capabilities in our processing codes