2016 MOS-AK Workshop: Xyce Update

With CMC Licensing Discussion

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Parallel Circuit Simulator

- Massively Parallel circuit simulator
  - Distributed Memory Parallel (MPI-based)
  - Unique solver algorithms
  - SPICE-Compliant
  - Industry standard models
  - ADMS model compiler

- Analysis types
  - DC, TRAN, AC, NOISE
  - Harmonic Balance (HB)
  - Multi-time PDE (MPDE)
  - Model order reduction (MOR)
  - Direct and Adjoint sensitivity analysis
  - Uncertainty quantification (UQ) via Dakota

- Sandia-specific models
  - Prompt Photocurrent
  - Prompt Neutron
  - Thermal

- Other, non-traditional models
  - Neuron/synapse
  - Memristor
  - Reaction network
  - TCAD (PDE-based)

http://xyce.sandia.gov
Xyce Releases 6.5 and 6.6

- Xyce 6.6 was released November 9, 2016
- Improvements in the last year
  - Xyce/ADMS Verilog-A model compiler code generation enhancements
    - Many model updates: PSP, BSIM6, MEXTRAM, VBIC, others
  - Improved support for noise, lead currents and power
  - Significant performance improvements
  - Improved support for .MEASURE, remeasure and restart features
  - Transient adjoint parameter sensitivities are now supported (in addition to direct)
Compact Model Licensing

- Things to keep in mind:
  - The compact model developers hold the license, not the CMC. CMC specifies a license for the developers to use to receive funding.
  - Software may be released under multiple licenses simultaneously. Therefore, developers may choose to release under the CMC license and (e.g.) GPLv3. This, however, can be a maintenance headache; and the CMC contract could be interpreted as forbidding this.

- CMC License Requirements
  - The license must allow use in proprietary commercial simulators
  - With Sandia as a member of the CMC, Open Source concerns are beginning to be addressed (since Xyce is a GPLv3-licensed code).
CMC Compact Model License

- It has changed recently (and may change, again)
  - The “export” clause was removed
  - The copyright notice retention clause was rewritten using language from the Modified BSD (a.k.a., 3-clause BSD) license.

- However, the two clauses considered problematic by the QUCS team remain (next slide)

- Note: a Sandia lawyer determined the the CMC license is not incompatible with GPLv3.
CMC License: Problematic Clauses

1. The users agree not to charge for the <developer or institution name> code itself but may charge for additions, extensions, or support.
   - “It establishes a non-commercial clause, which is incompatible with GPL. If the code is included in a media which is sold (by the cost of the media or shipping cost) it is impossible to discern if the distributor is charging for your source or not. This is incompatible with GPL.”

2. In any product based on the software, the users agree to acknowledge the <developer or institution name> that developed the software. This acknowledgment shall appear in the product documentation.
   - “It essentially requests to keep the copyright notice, which is fine. However the request for documentation (shall? must?) creates a practical problem which make it incompatible with GPL.”
Discussion

- https://www.gnu.org/licenses/licenses.html
- https://www.gnu.org/licenses/license-list.html
- https://www.apache.org/licenses/LICENSE-2.0
Extra
On GPL and Plugins

- [https://www.gnu.org/licenses/gpl-faq.html#GPLAndPlugins](https://www.gnu.org/licenses/gpl-faq.html#GPLAndPlugins)
  - If the program uses fork and exec to invoke plug-ins, then the plug-ins are separate programs
  - If the program dynamically links plug-ins, and they make function calls to each other and share data structures, we believe they form a single program