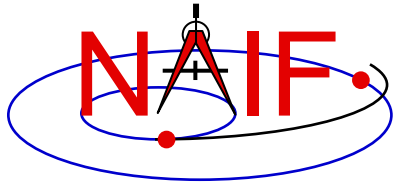


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SPICE Development Plans and Possibilities

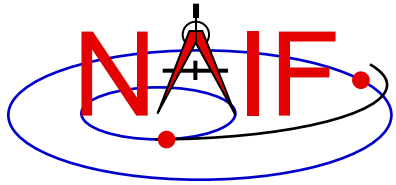
January 2020



DSK Shape Models

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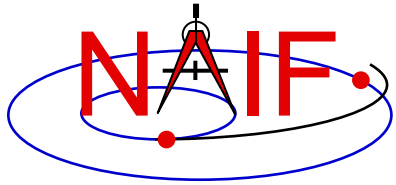
- **Extension of the DSK shape model subsystem**
 - Complete the Type 4 DSK code for working with digital elevation models
 - Add more functionality to the tessellated plate model (Type 2 DSK)
 - » The first official release of the Type 2 subsystem, for small, irregularly shaped bodies, was released in the N66 Toolkits
 - Unfortunately NAIF has no real target date in mind for this work



SPICE 2.0

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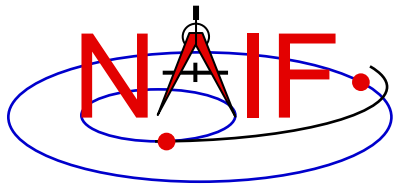
- **Develop SPICE 2.0: a re-implementation of the SPICE Toolkit from the ground, up, providing thread-safe and object oriented features**
 - This is the major NAIF undertaking, started in May 2017
 - It is being implemented in C++11
 - It is expected to take several years
- **No worries: none of the current Toolkits will be dropped.**



Program Development

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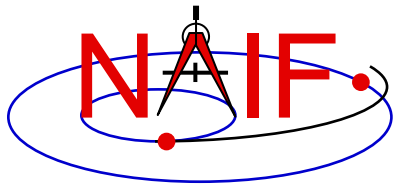
- **Continue adding capabilities to the WebGeocalc tool**
 - More kinds of calculations
 - More ease-of-use features
 - This work is on-going
- **Continue adding capabilities to the Cosmographia 3D mission visualization program**
 - This work is on-going



Model Development

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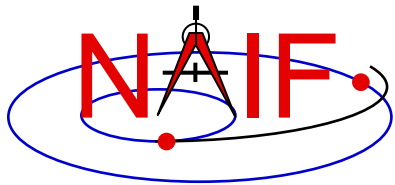
- **Complete and release a large set of dynamic frames in a generic frames kernel (or kernel set)**
 - Much work was done on this, but in the end it appears impossible to achieve community consensus on key aspects
- **Add some aspects of ring models**
 - At least ring reference frames
 - Maybe also shapes?
 - No active work on this



More API Interfaces - 1

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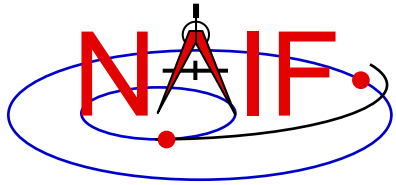
- **Complete the Java Native Interface (JNI Spice) Toolkit family**
 - Reliability is felt to be very good
 - » (NAIF used JNI Spice to implement the WebGeocalc tool)
 - Additional documentation needs be written
- **Python interface**
 - Several SPICE users have implemented and are offering their own, partial Python interfaces to SPICE
 - » Check here for links to two of them
 - <http://naif.jpl.nasa.gov/naif/links.html>
 - NAIF's use has been limited to preparing a few SpiceyPy lessons
 - Others report these offerings appear to be good quality products
 - Thus NAIF seems unlikely to do any of its own Python work



More API Interfaces - 2

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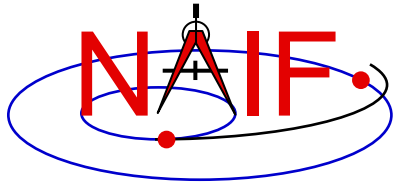
- **3rd parties have also implemented Ruby, Swift and Julia interfaces to CSPICE.**
 - NAIF hasn't tried testing any of these
 - NAIF does not know how complete these are
 - Give them a try, but use due caution as you do so
 - » You might be able to do some one-off tests using the WebGeocalc tool as a “gold bar”
 - » You could try using the “spice_discussion” bulletin board to see what other people have to say about these interfaces



Some Other Possibilities?

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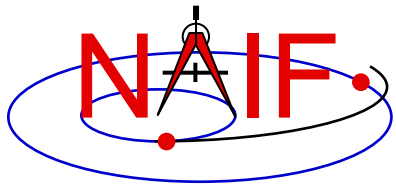
- **More high-level SPICE 1.0 (current SPICE) computations, such as instrument footprint coverage**
- **More “geometry finder” computations**
- **Develop a more flexible and extensible instrument modeling mechanism**



Programmatic Expansion

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- **NAIF is helping the Republic of South Korea learn to use SPICE in support of their upcoming Korean Pathfinder Lunar Orbiter (KPLLO) mission**
- **Colleagues at LASP are helping the United Arab Emirates deploy SPICE in support of their upcoming Hope mission to Mars**
- **We hope to find the means to support upcoming science-focused SmallSat/CubeSat missions**
 - **Example: Lunar IceCube**



What do **You** Suggest?

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- **NAIF solicits suggestions from you!**
 - How might we improve SPICE?
 - How might we improve SPICE training?
 - How might we improve NAIF's operations?
 - How might we improve SPICE operability across the large and still growing international community?
- **We're interested in programmatic ideas as well as technical ones.**