



Navigation and Ancillary Information Facility

SPICE Development Plans and Possibilities

April 2023



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
- **More details in “SPICE 2.0 Preview” Tutorial (available upon request)**
- **No worries: none of the current Toolkits will be dropped.**



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 developed for SMAP
 - Add more functionality to the tessellated plate model (Type 2 DSK)
 - » The first official version 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



Tool 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



Support for More Languages- 1

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- **Complete the Java Native Interface (JNI Spice) Toolkit family**
 - Capability is parallel to CSPICE, and reliability is very good
 - » NAIF used JNI Spice to implement the WebGeocalc tool
 - Additional documentation needs to be written
- **Python interface**
 - 3rd party SpiceyPy enjoys wide adoption and use, fulfilling the needs of the community
 - Because of that, NAIF does not plan to do its own Python work in the foreseeable future



Support for More Languages- 2

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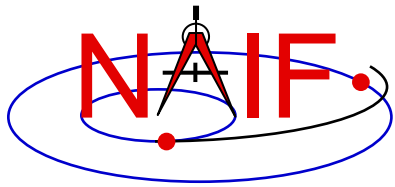
- **3rd parties have also implemented Ruby, Swift, Julia, Rust, Unreal Engine interfaces to CSPICE**
 - NAIF server provides links to some of them
 - » <https://naif.jpl.nasa.gov/naif/links.html>
 - NAIF hasn't tried testing any of these packages
 - NAIF does not know how complete they are
 - Give them 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 specular point**
- **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 implement SPICE on their Korean Pathfinder Lunar Orbiter (KPLO) 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 planetary science-focused SmallSat/CubeSat missions and Commercial Lunar Payload Systems (CLPS) program**



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 space exploration community?
- **We're interested in programmatic ideas as well as technical ones.**