

# Picante – A Pure Java Implementation of NAIF/SPICE

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## What is SPICE?

SPICE is a widely used software library for space missions developed by the Navigation and Ancillary Information Facility (NAIF) at NASA's Jet Propulsion Laboratory. It performs many common calculations such as

- Spacecraft and celestial body ephemerides
- Frame transforms
- Instrument observation geometry

SPICE is available as natively compiled libraries, along with source code from <https://naif.jpl.nasa.gov>. Java programmers can use a JNI (Java Native Interface) that wraps the native code with Java calls.

## What is Picante?

Picante is a pure Java implementation of core SPICE routines, developed by the Analysis and Applications group of the Space Exploration Sector of the Johns Hopkins University Applied Physics Laboratory.

It reproduces ephemeris calculations and frame transforms to 1e-12 precision. Multiple "SpiceEnvironment" objects can be instantiated for multithreaded processing, or comparing calculations with differing kernel sets.

It has been used on many past and ongoing missions, including:

- CASSINI
- MESSENGER
- New Horizons
- Lunar Reconnaissance Orbiter
- DART
- Europa Clipper
- Dragonfly

### Advantages over JNISpice:

- It does not require the developer and user to install native SPICE libraries
- It is thread safe (this is a limitation of NAIF/SPICE)
- Available from Maven Central

### Incompatibilities:

- Some CK and SPK types are not supported
- DSK files are not supported
- Product and Switch frames are not supported.

## How can I use Picante?

Picante is freely available under the MIT license at <https://github.com/JHUAPL/Picante>

Demo code and unit tests are included to demonstrate many common SPICE functions.

Precompiled jar files are available at Maven Central. Include this block in your POM:

```
<dependency>
  <groupId>edu.jhuapl.ses</groupId>
  <artifactId>picante</artifactId>
  <version>1.0.0</version>
</dependency>
```

<https://github.com/JHUAPL/Picante/>

