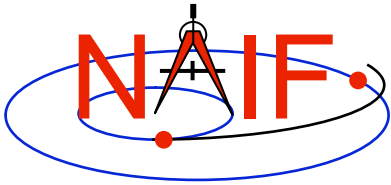


Navigation and Ancillary Information Facility

Porting Kernels

September 2009



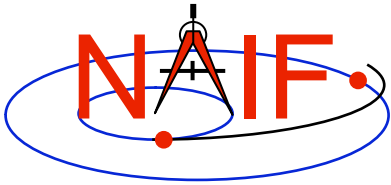
Introduction

Navigation and Ancillary Information Facility

- **The situation with regard to porting SPICE kernels between computers has evolved substantially over the years.**
- **Trying to explain all requirements—past and current—is a complex undertaking and can be rather confusing to customers.**
- **Here we will address only “current” requirements:**
 - those pertaining to the use of Toolkit version N60* or later
 - those pertaining to the use of only computing environments currently supported by NAIF**

* Toolkit version N60 was released January 2006

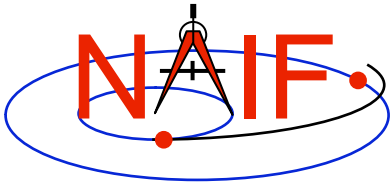
** Currently supported environments are enumerated in the “whats.new” text file bundled with each Toolkit, and in the “Intro to Toolkit” tutorial



Porting Issues - 1

Navigation and Ancillary Information Facility

- **Data formats vary across platforms, so data files created on platform “X” may not be usable on platform “Y.”**
 - **Binary data formats:** different platforms use different bit patterns to represent numbers (and possibly characters).
 - **Text formats:** different platforms use different mechanisms to represent “lines” in text files.
 - › Usually a “line terminator character sequence” indicates end-of-line.
- **We say two platforms have “compatible” binary or text formats if they use the same binary or text data representations.**
- **We say that a file is “native” if its format is that used on the computer being used by you.**



Porting Issues - 2

Navigation and Ancillary Information Facility

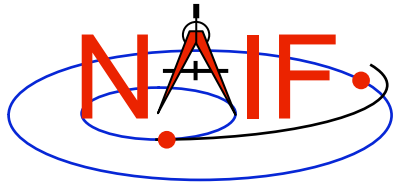
- Toolkit software **can** often read kernels obtained from an incompatible platform
 - Binary SPK, CK, or PCK kernels from one system can be read on an incompatible system (e.g. any pair of PC, Mac, Sun).
 - Text kernels from one system can be read on an incompatible system (e.g. any pair of PC, Mac, Sun) when using a C, IDL or MATLAB toolkit.
- The Toolkit **cannot** read certain kernels from incompatible platforms
 - **Text kernels, if using a FORTAN toolkit**
 - **DAS-based files, such as E-kernels (ESQ) or shape model kernels (DSK)**



Porting Issues - 3

Navigation and Ancillary Information Facility

- **When the Toolkit cannot read an incompatible kernel, conversion is required to make the kernel usable. Several options are available.**
 - **Use *bingo* for both binary and text kernels**
 - › Available only from the NAIF website; not provided in Toolkit packages
 - **For text kernels, file transfer using ftp in ASCII mode will perform the required format conversion on the fly.**
 - **Web browsers often do text format conversion.**
 - › However ASCII mode may not be available – sftp clients usually don't provide it. In such cases other tools such as dos2unix and unix2dos must be used.
 - **For binary kernels, the SPICE *toxfr* and *tobin* tools may be used to convert files to and from SPICE transfer format**
 - › This is an ASCII format that may be transferred in the same way as other ASCII files.

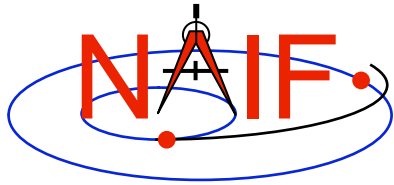


Compatible Environments for Text Kernels

Navigation and Ancillary Information Facility

Since text kernels are only text files...

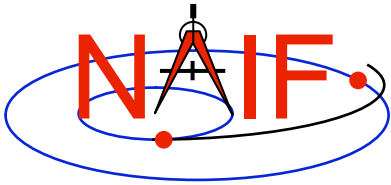
	<u>Groupings of Text Compatible Environments</u>	<u>End of line indicator</u>
1	PC using Windows or N T	<CR><LF>
2	Unix PC with LINUX Macintosh OSX (Motorola or Intel chip)	<LF>



Compatible Environments for Binary Kernels

Navigation and Ancillary Information Facility

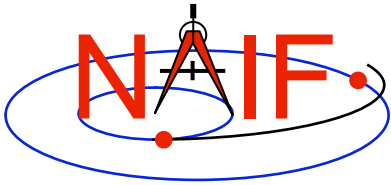
	<u>Groupings of Binary Compatible Environments</u>	<u>Binary Representation</u>
1	PC/ Windows PC/Linux Mac Pro (Intel chip) (the new ones)	IEEE - Little endian
2	Sun Mac Power PC (Motorola chip)	IEEE - Big endian



Caution Using Email

Navigation and Ancillary Information Facility

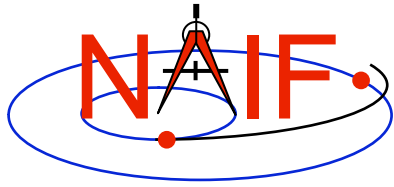
- **NAIF recommends against the use of email to transfer kernels...**
...unless tests prove successful using the same conditions/ computers intended for current use. Possible causes of problems are:
 - incompatible binary or text representations (as already discussed).
 - an attachment size limit somewhere in the e-mail chain.
 - the sender's or recipient's mail client modifies the kernel based on file name or presumed content.
- **When you must email kernels, compress either with zip, or gzip (or stuffit), then send the compressed file as an email attachment.**



Binary Kernels - Caveats

Navigation and Ancillary Information Facility

- If the kernel you are using is a non-native binary kernel you can read this file but you may not write data to this file.
 - The reading is accomplished using run-time conversion
 - You can not use the SPICE Toolkit's "commnt" or "spacit" programs, or any other means, to write information into the comment area, or to delete information from the comment area.
 - You cannot append additional data to the kernel.
- Run-time conversion does not work for E-kernel (ESQ) or shape model (DSK) kernels.
 - More generally, it does not yet work for any file built upon the SPICE "DAS" architecture.



Binary Kernels Allowed Operations

Navigation and Ancillary Information Facility

- You may “load” and read both non-native and native binary kernels in the same runtime instance
- You may merge any combination of native and non-native SPK files
 - The resultant, merged SPK file will be in native format