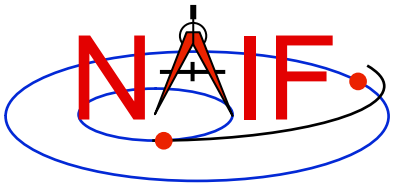

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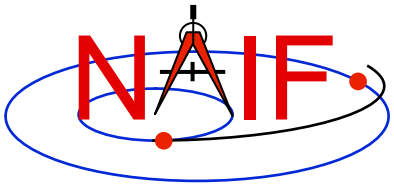
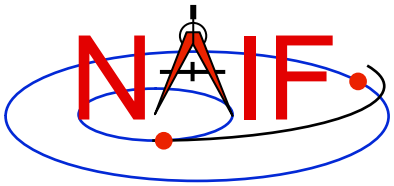
Porting Kernels

March 2010



Porting Issues - 1

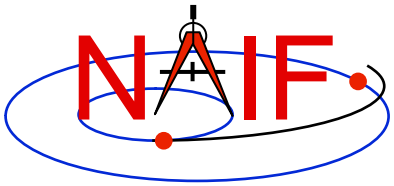
- Data formats vary across platforms, so data files created on platform “X” may not be usable on platform “Y.”
  - Binary data formats: different platforms use different bit patterns to represent numbers (and possibly characters).
  - Text formats: different platforms use different mechanisms to represent “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

- 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

- When the Toolkit cannot read an incompatible kernel, conversion to native format 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, or bingo, 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

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Since text kernels are only text files…

	Groupings of Text Compatible Environments	End of line indicator
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

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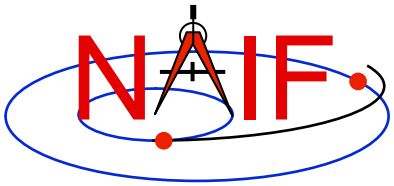
	Groupings of Binary Compatible Environments	Binary Representation
1	PC/ Windows PC/Linux Mac Pro (Intel chip) (the new ones)	IEEE - Little endian
2	Sun Mac Power PC (Motorola chip)	IEEE - Big endian

Caution Using Email

- **NAIF recommends against the use of email to transfer kernels…**

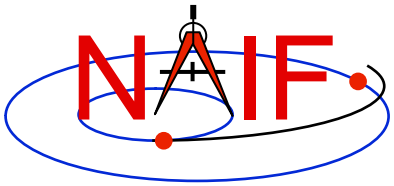
  …unless tests prove successful using the same conditions/ computers intended for current use. Possible causes of problems are:

  - **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

- **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

- 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