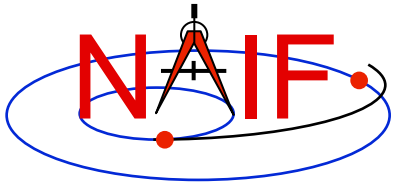


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Navigation and Ancillary Information Facility

# Porting Kernels

April 2016

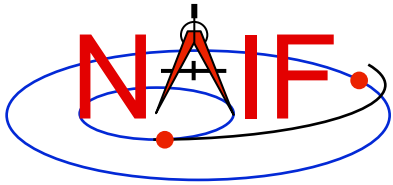


# Porting Issues - 1

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- **Data formats vary across platforms, so data files created on platform “X” may not be usable on platform “Y.”**
  - **Binary 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 the same as that of the computer you are using.**



## Porting Issues - 2

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- Toolkit software can **usually** read kernels obtained from an incompatible platform
  - Binary SPK, CK, or PCK kernels from one system can always be read on an incompatible system
  - Text kernels from one system can be read on an incompatible system only when using a C, IDL or MATLAB Toolkit
- The Toolkit **cannot** read certain kernels from incompatible platforms
  - Text kernels, if using a FORTAN toolkit
  - DLA-based files, used for digital shape kernels (DSK)
  - DAS-based files, used for E-kernels (ESQ)
- See later charts for compatibility matrix

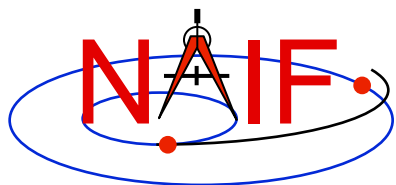


## Porting Issues - 3

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- **When 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, doing your file download 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-based format that may be transferred in the same way as other ASCII files.

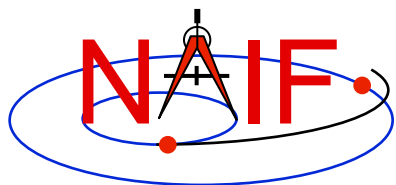


# Compatible Environments for Text Kernels

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Since text kernels are only text files...

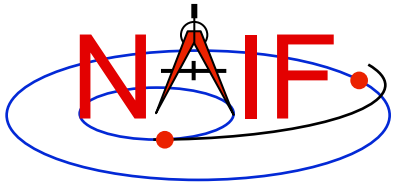
	<u>Groupings of Text Compatible Environments</u>	<u>End of line indicator</u>
1	PC using Windows or N T	<CR><LF>
2	Unix PC with LINUX Macintosh OSX (Motorola or Intel chip)	<LF>



# Compatible Environments for Binary Kernels

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	<u>Groupings of Binary Compatible Environments</u>	<u>Binary Representation</u>
1	PC/ Windows PC/Linux Mac Pro (Intel chip)	IEEE - Little endian
2	Sun Mac Power PC (Motorola chip, discontinued after 2005)	IEEE - Big endian

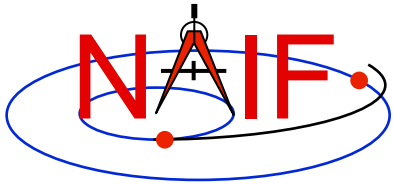


# Caution Using Email

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- **NAIF recommends against the use of email to transfer kernels unless previous tests have already proven 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 them either with zip, or gzip (or stuffit), then send the compressed file as an email attachment.**



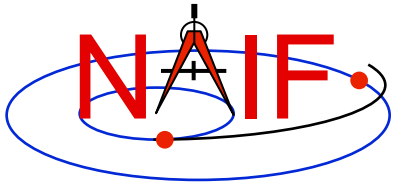
# Binary Kernels - Caveats

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- 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.
  - You **can read** most non-native binary kernels using the automatic run-time conversion capability found in the APIs of modern Toolkits.
  - You **cannot write** information into the comment area, or 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” or “DLA” architectures.



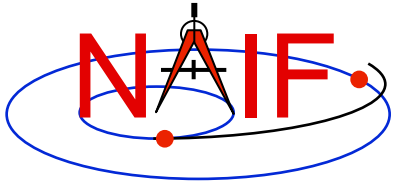


# Binary Kernels Allowed Operations

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- **You may “load” and read both non-native and native binary kernels in the same runtime instance**
  - But not including DSKs or ESQs
- **You may merge any combination of native and non-native SPK files**
  - The resultant, merged SPK file will be in native format



# Text Kernels - Caveats

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- **Cutting/pasting complete, or pieces of, data assignments or `\begindata` or `\begintext` markers into a text kernel can cause a problem**
  - It may result in insertion of non-printing characters or incorrect end-of-line terminations
  - This is not a problem for comments, but it is probably best to treat all portions of a text kernel the same
- **If creating a text kernel by editing an existing one:**
  - first save a backup copy
  - be sure you are starting with a file in native format for the computer you are using: either Unix/Linux/Mac or Windows
  - be sure to insert a final end-of-line marker at the end of your last line of data or text
    - » Press “return”