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Multilingual vi Clones:
Past, Now and the Future

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Multilingual vi clones: past, now and the future

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Outline

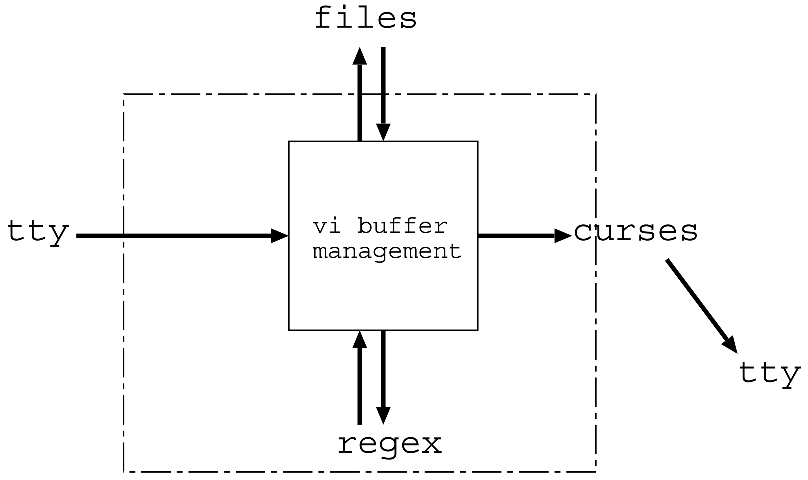
- □ Internal structures and issues in:
  - ○ Japanized elvis
  - ○ Multilingual nvi
- □ Experiences gained in asian multibyte characters support
- □ Note: Unicode is not a solution here
  - ○ to be discussed later

Assumptions in normal vi/vi clones

- ASCII (7bit) only, 8bit chars just go through
  - The terminal software defines interpretation
- One byte occupies 1 column on screen (except tabs)
- Assumes western languages - space between words

Architecture of normal vi

- tty input, filesystem, tty output (curses), vi internal buffer use the same encoding



Western character encodings

□ Character encoding and the language => assumptions

  ○ Single byte encodings

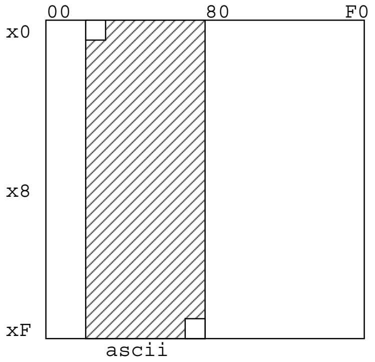
□ "ASCII" encoding

  ○ ASCII character set: 94 characters

□ Latin 1 encoding:

  ○ ASCII character set

  ○ iso-8859-1 character set, shifted 0x80



ISO-2022 system

□ Extensible character encoding system

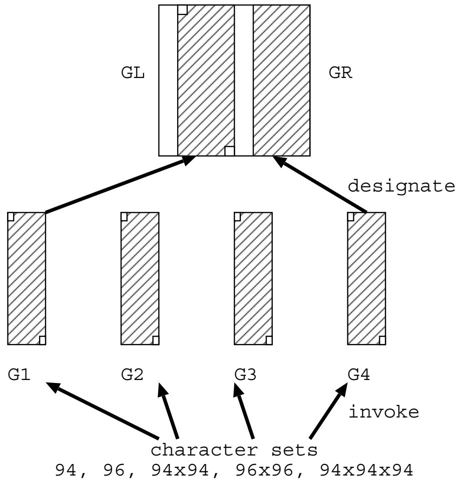
  ○ By switching multiple character sets by escape sequences

  ○ Character set contains 94, 96, 94x94, 96x96, 94x94x94 chars

□ ISO-2022 subset encodings are everywhere

  ○ Latin 1: fixed mapping with ASCII and iso-8859-1

  ○ X11 ctext



Japanese encodings

A	B	C	4	A	;	z	1

- □JIS X0208 character set: 94x94 characters
- □iso-2022-jp: Internet emails/netnews, UNIX
  - ○41 42 43 1B 24 42 34 41 3B 7A 1B 28 42 31
- □euc-jp: UNIX and other places
  - ○41 42 43 B4 C1 BB FA 31
- □sjis: MS-DOS and Macintosh community
  - ○41 42 43 8A BF 8E 9A 31
  - ○Not an ISO-2022 variant

- □Same character sets, different encoding method
- □Single encoding is not sufficient - they all are used in various places!

Asian people needs multibyte/multilingual support

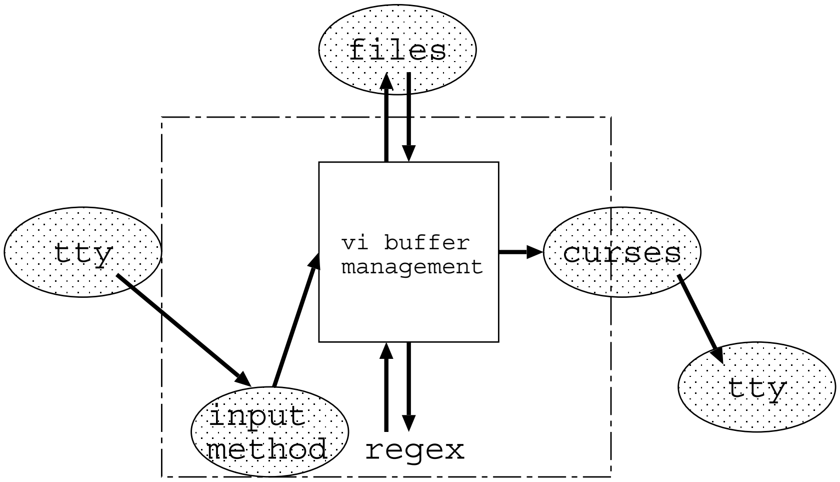
- □Multibyte character sets support
  - ○2 or more byte/letter
- □Byte width != character width on screen
- □Input methods: ondemand conversion from ASCII to multibytes
  - ○Use third-party libraries, like Canna or Wnn
- □Switching various external encoding methods
  - ○For file and terminal I/O
- □**Seamless** multilingual support

- □=> Clarify/remove the assumptions made in vi implmentation

- □European people benefits from this as well
  - ○Handle iso-8859-x, koi8-r, and others in proper way
- □Multilingual is more desirable than monolingual (Japanize)
  - ○Maintenance issues

architecture of multilingual vi

- □Can’t assume single encoding
- □Need input method (inside or outside vi)
- □Must be able to switch encodings
  - ○tty input, input method, filesystem, tty output can use different encoding
- □Internal encoding is the key issue



Design goals: What is "seamless"?

- □No "Chinese mode" nor "Japanese mode" in the editing session

- □Any character set can be mixed in a text, without twist
  - ○Some of character encodings can accomodate, say Chinese, Korean and Japanese character sets at the same time
  - ○Mixed language texts - Chinese document annotated with Japanese

- □Preserves information in the file
  - ○No implicit conversion/translation
  - ○Implicit conversion confuses user, and it does not match the vi design
  - ○If you need conversion, use `:!`

- □Behaves just like normal vi, over multilingual characters
  - ○regex, cursor movement, whatever

"jelvis" - Japanized elvis

□First generation of implementation

□Based on elvis by Steve Kirkendall

□Internal encoding: euc-jp

□External encoding: iso-2022-jp, euc-jp, sjis

□Internal encoding: 41 42 43 B4 C1 BB FA 31

A	B	C	4	A	;	z	1

□Internal encoding bytewidth == screen width

○2 bytes, 2 columns

□Maintenance/synchronization problem with kelvis/celvis

○=> Multilingual implementation is desirable

"nvi-m17n" - multilingualized nvi

□Current generation of implementation

□Based on nvi by Keith Bostic

□Internal encoding: internal multibyte encoding

○ASCII is 1 byte

○0x80-0xff are "multibyte tag" character

○This is similar to Mule (multilingual emacs)

□External encoding: any of iso-2022 variants, and others

□Internal encoding: 41 42 43 88 34 41 88 3B 7A 31

○"88" is the tag for JIS X0208 Kanji character set

A	B	C	4	A	;	z	1

□Internal encoding bytewidth != screen width

Additional features

□ Switching I/O encoding:

- ○ `:set fileencoding=iso-2022-jp`
- ○ `:set inputencoding=big5`
- ○ `:set displayencoding=euc-tw`

□ Input method support: "Canna" library from NEC

- ○ `:set cannaserver=server.itojun.org`
- ○ `:set cannakey=^O`

Word boundary issues

□ Asian words are not separated by spaces!

□ Define word movement over Asian characters

- ○ The exact "word" movement requires syntactic analysis and dictionary lookup (very hard)

□ Define character classes

- ○ Kanji letters, hiragana letters, western, symbols

□ Define movement over word boundary

□ Solves problem for most of the cases

`GkLn$O`Freenix`2q>l$K$$$^$9`!!

□ Need for explicit language information

Regex library

- Some of regex library uses 2^7 as flag bit
  - Separate flag bit from the characters

- Character range ([a-z0-9]) as bitmap
  - Impossible for multibyte chars/multilingual internal code
  - Bitmap for ASCII, start-end for others

- Metacharacter (.) must match against single multibyte char

Curses library

- Store character set information into screen buffer
- Render accordingly on redraw
  - Chararcter set
  - Character data (multibyte)
  - Offset from the beginning of the glyph

- Multi-width characters support
  - Need to erase right half, when left half is overwritten

A	B	C	4	A	;	z	1

- Multibyte with **`addch()`** is cumbersome, use **`addstr()`**
  - Intermediate state is hard to manage

Unicode as internal encoding?

- Unicode characteristics:
  - Well documented external multibyte encoding (UTF8/16)
  - 16 or 32bit fixed wide char for internal encoding (UCS2/4)

- Asian characters are "unified"
  - Some of Chinese/Korean/Japanse characters are mapped into single Unicode codepoint
  - As different characters are mapped into single codepoint, information will be lost (inverse conversion is impossible)
  - Language tagging -> "fixed-width wide char" is impossible

- Unicode is useful for "monolingual" asian processsing
  - For example, ASCII + Chinese only
  - Or, modal support like "Chinese mode" or "Korean mode"
- Unicode is not useful for multilingual processing
- Additional Unicode support would be good
  - Unicode as a character set we support, not as the internal encoding

nvi-m17n: next generation

- Use wide char (wchar_t) for internal code
  - ISO/JIS standards suggest wide char
  - Memory is now cheap

- Can’t really rely upon vendor’s locale library
  - Too little support for stateful multibyte encodings

- Need massive modification to various places
  - Support for multiple encoding in locale library
  - Support for wide char in curses/regex/whatever

- Feedback modified locale library to the community

- Add Unicode support
  - Supply file converter as external tool

Wide character library: status

- Wide char library is not really ready
    - curses, regex
    - Need support for column width query (for curses)
- Bugs in vendor-supplied locale library
    - Not heavily tested?
- Changing from char to wchar_t is a big leap for the source code tree

- glibc
    - Assumes Unicode (no support for stateful encodings), single encoding in a program
- runelocale library
    - Encoding switchable by `$LANG`, no support for stateful encodings, single encoding in a program

Observation

- Normal vi
    - 1byte/char
    - Single encoding (= ASCII)
- Japanized vi (jelvis)
    - Multibyte/char, bytewidth == width on screen
    - Multiple encoding in a program
- Multilingual vi (nvi-m17n)
    - Multibyte/char, bytewidth != width on screen
    - Multiple encoding in a program
- Next multilingual vi
    - Wide char, bytewidth != width on screen
    - multiple encoding in a program

- Multilingualization = less assumptions!

Future work

- Provide modified runelocale library separately to *BSD

- Right-to-left languages

- Support for other input method: cWnn (Chinese Wnn)

References

- mailing list: `nvi-m17n@foretune.co.jp`
  - discussions are (at this moment) mainly in Japanese language, questions in English are welcome
- `ftp://ftp.foretune.co.jp/pub/tools/jelvis/`
- `ftp://ftp.foretune.co.jp/pub/tools/nvi-m17n/`

- Ken Lunde, "CJKV information processing", O’reilly