Experimenting with a TTY Connection for R

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What is a TTY?

A TTY, or computer terminal is a two-way asynchronous communications channel with configurable properties. The name “TTY” derives from the teletype or text telephone.
configurable:

- line endings: ‘\n’ vs. ‘\n\r’
- keyboard interrupts: ctrl-c → SIGINT
Serial Terminal

configurable:
- serial protocol: baud rate, character size, stop bits,
- serial protocol: parity, flow control
POSIX

- Portable Operating System Interface for Unix
- "POSIX" suggested by Richard Stallman (useR! 2010 Invitee)
- [IEEE and The Open Group, 2008]
- Defines a standard and API for OS interface
  - Character Set & Locale
  - Environment Variables
  - Headers
  - General Terminal Interface

*The General Terminal Interface shall be supported on any asynchronous communications ports if the implementation provides them.*
OS Support for the General Terminal Interface

- Linux and UN*X (native)
- Mac OS X (native)
- Microsoft Windows (indirect)
Implementing the General Terminal Interface in R

Strategy:

- specify a new type of R connection
- implement a tty function
- configure the TTY using arguments to tty

Rationale:

- parsimonious with the R/S concept of IO
- utilize generic functionality (readBin, flush, etc.)
Implementing a New R Connection

The R connection internal code is NOT available to package developers. Hence, new R connection implementations

▶ cannot be in an R package
▶ must patch the R source code
▶ cannot be distributed via the CRAN

The R connection internals (at R 2.12.0) are detailed in an unofficial collection of notes: *R Connection Internals* [Shotwell, 2010] in HTML and PDF. patch + instructions.
The TTY Connection for R: The `tty` Function

The TTY connection patch provides:

```r
tty <- function (description, open = "", blocking = TRUE, baudrate = NULL, 
    input = NULL, output = NULL, control = NULL, local = NULL, 
    chars = NULL) { ... }
```

- `input`, `output`, `control`, `local`, and `chars` are each lists of configurable TTY parameters (see `?tty` and the *General Terminal Interface* [IEEE and The Open Group, 2008])
- `tty` returns an instance of the ‘connection’ class
The TTY Connection for R: Text Terminal Application

# get a password from the terminal, don't echo characters
getpass <- function(prompt="password:") {
  cat(prompt)
  con <- tty("/dev/tty", local=list(ICANON=TRUE,ECHO=FALSE))
  pw <- readLines(con, 1)
  close(con)
  cat("\n")
  invisible(pw)
}

R> print(getpass())
password:
[1] "mysecretpassword"
The TTY Connection for R: Serial Terminal Application

μC Temperature Sensor Interface
The TTY Connection for R: Biomedical Application

http://biostatmatt.com/archives/78
Technical report, Institute of Electrical and Electronics Engineers & The Open Group.

R connection internals.