TCL and GNU Readline

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  - http://www.gnu.org/software/readline/

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About TCL/TK

- ▸ TCL (Toolkit Command Language)
  - ▸ Web and desktop applications, network programming, embedded development, testing, general purpose programming, system administration, database work, and many, many more
- ▸ Dynamic, String-oriented Language
- ▸ Tk Graphical Toolkit
  - ▸ GUIs that are incredibly simple yet remarkably powerful
  - ▸ Tk canvas widget makes it easy to create displays with graphics,
  - ▸ Including powerful facilities such as bindings and tags
  - ▸ text widget provides sophisticated hypertext capabilities and more.
- ▸ Rapid Software Development

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TCL Basics - 1

- ▸ Commands separated by semicolons or newlines
  - ▸ expr 20 + 10
  - ▸ tclsh is a basic TCL Shell
- ▸ Variables
  - ▸ set x 32
  - ▸ expr $x*3
- ▸ Command Substitution
  - ▸ set cmd expr
  - ▸ set x 11
  - ▸ $cmd $x*$x
  - ▸ set a 44
  - ▸ set b [expr $a*4]

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TCL Basics - 2

▸ Quotes and Braces
  ▸ Double-quotes allow you to specify words that contain spaces
  ▸ set x 24
  ▸ set y 18
  ▸ set z "$x + $y is [expr $x + $y]"
  ▸ z will have the value 24 + 18 is 42
▸ Quotes and Braces
  ▸ (a) command and variable substitutions are performed on the text between the quotes
  ▸ (b) the quotes themselves are not passed to the command
▸ Curly Braces
  ▸ no substitutions are performed on the text between the curly braces
  ▸ set z {$x + $y is [expr $x + $y]}
  ▸ This command sets variable z to the value
    "$x + $y is [expr $x + $y]"

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TCL Basics - 3

▸ Control Structures
  ▸ Tcl provides a complete set of control structures including commands for conditional execution, looping, and procedures
  ▸ Tcl control structures are just commands that take Tcl scripts as arguments
  ▸ The example below creates a Tcl procedure called power, which raises a base to an integer power:
  ▸
```
proc power {base p} {
    set result 1
    while {$p > 0} {
        set result [expr $result * $base]
        set p [expr $p - 1]
    }
    return $result
}
```

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TCL Basics – 4

- Examples of using proc
  - power 2 6
  - power 1.15 5
- Tcl commands are created in **three** ways
  - One group of commands is provided by the Tcl interpreter itself
    - These commands are called *builtin commands*
    - The builtin commands are present in all Tcl applications
  - The second group of commands is created using the Tcl extension mechanism
    - Tcl provides APIs that allow you to create a new command by writing a *command procedure* in C or C++ that implements the command
    - You then register the command procedure with the Tcl interpreter by telling Tcl the name of the command that the procedure implements
    - In the future, whenever that particular name is used for a Tcl command, Tcl will call your command procedure to execute the command
  - The third group of commands are those defined in TCL
    - By the proc command

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TCL Basics – 5

- Other Features
  - More control structures, such as if, for, foreach, and switch
  - String manipulation, including a powerful regular expression matching facility.
    - Arbitrary-length strings can be passed around and manipulated just as easily as numbers.
  - I/O, including files on disk, network sockets, and devices such as serial ports
  - Tcl provides particularly simple facilities for socket communication over the Internet
  - File management: Tcl provides several commands for manipulating file names, reading and writing file attributes, copying files, deleting files, creating directories, and so on.
  - Subprocess invocation: you can run other applications with the exec command and communicate with them while they run.
  - Lists: Tcl makes it easy to create collections of values (lists) and manipulate them in a variety of ways.
  - Arrays: you can create structured values consisting of name-value pairs with arbitrary string values for the names and values.
  - Time and date manipulation.
  - Events: Tcl allows scripts to wait for certain events to occur, such as an elapsed time or the availability of input data on a network socket.

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TCL C API

▸ http://www.tcl.tk/man/tcl8.5/TclLib/contents.htm
▸ Tcl_FindExecutable()
▸ Tcl_CreateInterp()
▸ Tcl_CreateObjCommand()
▸ Tcl_Eval()

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GNU Readline

▸ The GNU Readline Library
  ▸ Two Interfaces
    ▸ Standard Interface – Control passed to readline()
      □ char *line = readline ("Enter a line: ");
    ▸ Alternative Interface – Event-based
▸ The GNU History Library
  ▸ Command History Management
    □ add_history (line);

▸ The GNU Readline User Interface

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GNU Readline Standard Interface Example

GNU Readline Standard Interface Example – page 1

```c
int main()
{
  char *text = NULL; // readline result //
  char *textexpansion; // readline result history expanded //
  int expansionresult;
  HIST_ENTRY **the_history_list; // readline commands history list - NULL terminated //
  char command[LINE_MAX]; // current command //
  unsigned long i;

  // Readline Initialisation //
  rl_completion_entry_function = NULL; // use rl_filename_completion_function(), the default filename completer //
  rl_attempted_completion_function = custom_completer;
  rl_completion_append_character = '\0';

  using_history(); // initialise history functions //
  while (1)
    {
      text = readline("PR> ");
      if (text != NULL)
        {
          expansionresult = history_expand(text, &textexpansion);
          if ((expansionresult == 0) || // no expansion //
              (expansionresult == 2)) // do not execute //
            {
              add_history(text);
              strcpy(command, text); // store command //
            }
          else
            {
              add_history(textexpansion);
              strcpy(command, textexpansion); // store command //
            }
          free(textexpansion);
          free(text);
        }
```

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GNU Readline Standard Interface Example

GNU Readline Standard Interface Example – page 2

```c
...
      // handle two basic commands: history and quit //
      if (strcmp(command, "quit") == 0)
        {
          return EXIT_SUCCESS;
        }
      else if (strcmp(command, "history") == 0)
        {
          the_history_list = history_list(); // get history list //
          if (the_history_list != NULL)
            {
              i = 0;
              while (*(the_history_list + i) != NULL) // history list - NULL terminated //
                {
                  printf("%d: %s\n", (i + history_base), (*(the_history_list + i))->line);
                  i++;
                }
            }
        }
    }
}
```

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