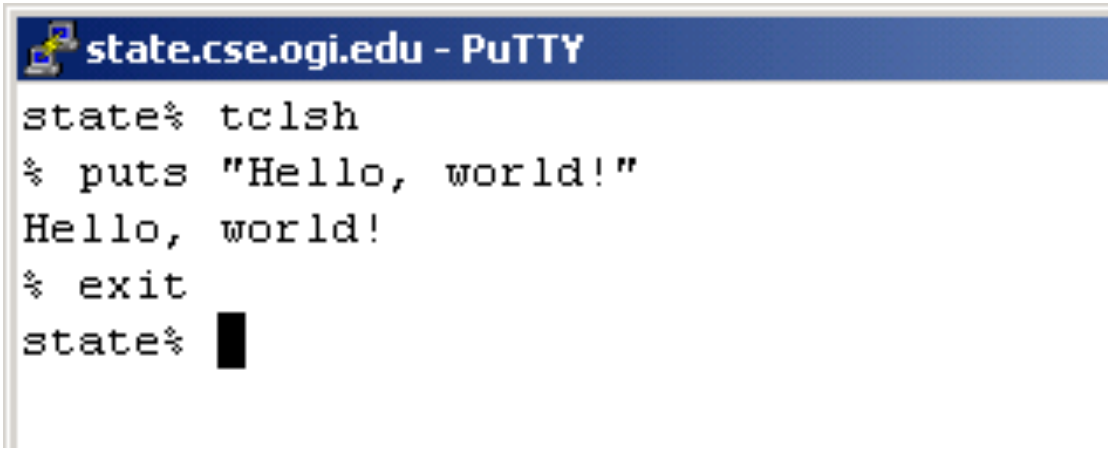
Tcl Tutorial

Hello World

- How to run your Tcl program
  - Command line (state.cse.ogi.edu or DOS)
    - Type "tclsh" to launch the console
  - Type your program directly on the console
  - Use the command "source" (source filename)
  - Double click your .tcl file (if associated)
- Output on the console
  - Command: `puts "Hello, world!"`

Hello World

- Command line (state.cse.ogi.edu or DOS)
  - Type "tclsh" to launch the console
  - Type tcl code into console

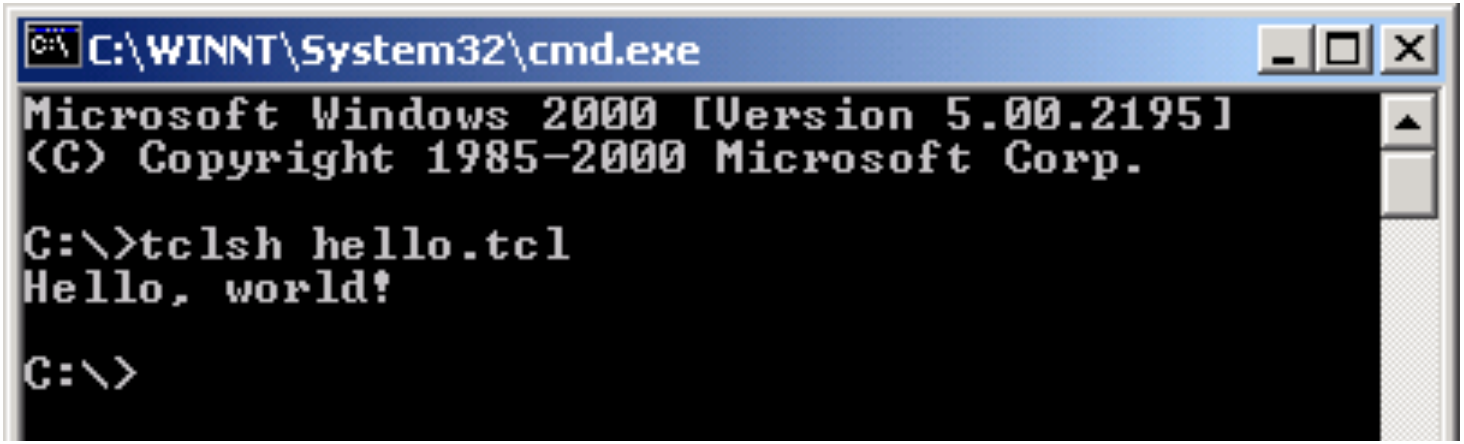


Hello World

- Sourced on the console
  - Type "tclsh", followed by name of program file

######### hello.tcl ########

```
puts "Hello, world!"
```



Hello World

- Double-clicking your .tcl file (if associated with wish84.exe)

######## hello.tcl #########

```
Hello.tcl
  wm withdraw .
  console show
  puts "Hello, world!"
```

hello.tcl

Basic operations

- print to screen (`puts`)

```
puts –nonewline "Hello, world!"
puts "!!"
```

- assignment (`set`)

```
set income 32000
puts "income is $income"
```

(using '$' to get the value of a variable)

- mathematical expressions (`expr`)

```
set a 10.0
expr $a + 5
expr int($a/3)
```

Some useful commands

- unset: destroy a variable

```
unset num
```

- info: check whether the named variable has been defined

```
if {![info exists num]} {
    set num 0
}
incr num
```

- window commands

```
wm withdraw .
console show
```

Special characters

`#` : single-line comments, similar to "//" in C

`;#` : in-line comments, just like "//" in C

`\` : escape character, same function as in C

: also used to break a long line of code to two lines

`$` : get the value of a variable

- var : name of variable
- $var : value of variable

`[]` : evaluate command inside brackets

Control structures (1)

- if then else

```
set income 32000
if {$income > 30000} {
    puts "$income -- high"
} elseif {$income > 20000} {
    puts "$income -- middle"
} else {
    puts "$income -- low"
}
```

- while loops

```
set i 0
while {$i < 100} {
    puts "I am at count $i"
    incr i
}
```

Control structures (2)

- for loops

```
for {set i 0} {$i < 100} {incr i} {
    puts "I am at count $i and going up"
    after 300
    update
}
for {set i 100} {$i > 0} {set i [expr $i - 1]} {
    puts "I am at count $i and going down"
}
```

- foreach loops

```
set lstColors {red orange yellow green blue purple}
foreach c $lstColors {
    puts $c
}
```

Control structures (3)

- foreach loops (con't)

```
set lstColors {red orange yellow green blue purple}
foreach {a b c} $lstColors {
    puts "$c--$b--$a"
}

set lstFoods {apple orange banana lime berry grape}
foreach f $lstFoods c $lstColors {
    puts "a $f is usually $c"
}

foreach {a b} $lstFoods c $lstColors {
    puts "$a & $b are foods. $c is a color."
}
```

Procedures

- procedure calls (embedded commands)

```
set b [expr $a + 5]
puts "The value of b is $b"
```

- create your own procedure (called by value only)

```
proc foo {a b c} {
    return [expr $a * $b - $c]
}
puts [expr [foo 2 3 4] + 5]

proc bar { } {
    puts "I'm in the bar procedure"
}
bar
```

Variable scope

local and global variables

```
set a 5
set b 6
set c 7
proc var_scope { } {
    global a
    set a 3
    set b 2
    set ::c 1
}
var_scope
puts "The value for a b c is: $a $b $c"
```

Lists in Tcl/TK

- Everything is a list!
- Many ways to create a list

```
set myList [list a b c]
set myList "a b c"
set myList {a b c}

set myList [list $a $b $c]
set myList {$a $b $c}

set myList [list a   b   c]
set myList "a   b   c"

set s Hello
puts "The length of $s is [string length $s]."
=> The length of Hello is 5.
puts {The length of $s is [string length $s].}
=> The length of $s is [string length $s].
```

List operations

```
set lstStudents [list "Fan" "Kristy" "Susan"]
puts [lindex $lstStudents 0]
puts [lindex $lstStudents end]
puts [llength lstStudents]
puts [llength $lstStudents]
lappend $lstStudents "Peter"
lappend lstStudents "Peter"
puts [linsert lstStudents 2 "Tom"]
puts [linsert $lstStudents 2 "Tom"]
set lstStudents [linsert $lstStudents 2 "Tom"]
set lstStudents [lreplace $lstStudents 3 3 "Rachel"]
set lstStudents [lreplace $lstStudents end end]
set lstStudents [lsort -ascii $lstStudents]
puts [lsearch $lstStudents "Peter"]
```

(unexpected result!)

(wrong!)

(wrong!)

Lists of lists (of lists…)

```
set a [list [list x y z]]
puts [lindex $a 0]
puts [lindex [lindex $a 0] 1]
puts [lindex [lindex $a 1] 0]
```
(unexpected result)

```
set a [list x [list [list y] [list z]]]
=> How to get to the z?

set arg1 [list g [list f [list h [list i X]]] [list r Y] k]
set arg2 [list g [list f [list h [list i Y]]] [list r b] L]
set both [list $arg1 $arg2]
puts $both
```

Array operations

Associative arrays (string as index)

```
set color(rose) red
set color(sky) blue
set color(medal) gold
set color(leaves) green
set color(blackboard) black
puts [array exists color]
```

(tests if an array with the name "color" exists)

```
puts [array exists colour]
puts [array names color]
```

(returns a list of the index strings)

```
foreach item [array names color] {
    puts "$item is $color($item)"
}
```

(iterating through array)

```
set lstColor [array get color]
```

(convert array to list)

```
array set color $lstColor
```

(convert list to array)

File operations

```
set fRead [open source.txt r]
set fWrite [open target.txt w]
while {![eof $fRead]} {
  set strLine [gets $fRead] ;#or gets $fRead strLine
  regsub -nocase -all "fan" $strLine "kristy" strLine
  puts $fWrite $strLine
}
close $fRead
close $fWrite
```

################ source.txt ################

Fan is a CSE student.

Fan is also one of Shania's fans.

Kristy and Fan are classmates.

Miscellaneous commands

- **eval**: execute a command dynamically built up in your program

```
set Script {
    set Number1 17
    set Number2 25
    set Result [expr $Number1 + $Number2]
}
eval $Script
```

- **exec**: execute external programs
- **clock**

Common pitfalls

- Missing `$` or extraneous `$`
- Using `{a}` vs `"a"` vs `[list a]`
- Creating list items that are empty lists

```
a b {} d
```