

Life without a path

-bash: xxxx: command not found



Don't get mad, just fix your path!



Six steps of the shell

- 1) Prompt *for a command*
- 2) Parse *what the user typed*
-  3) Search *the path for the parsed command*
- 4) Execute *the command found*
- 5) Nap
- 6) Repeat

The Path

- The path is a ordered set of directories that contain commands.
- The shell will search these directories from left to right.
- If you try to run a command **xxxxx** that is not on your path the shell will print an error message like:

```
-bash: xxxxx: command not found
```

- To run a command that is not on your path, you must know where it is and specify it with a complete pathname. E.g. **/usr/bin/who** or **./myscript**
- To show your path use: **echo \$PATH**
- To set your path use these examples:
 - PATH=directory:directory:directory** *(sets entire path to three directories)*
 - PATH=\$PATH:directory** *(appends a directory to current path)*

View your shell path on Opus-II

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/cis90/simben/..  
/bin:/home/cis90/simben/bin:.
```

The shell will search the path for commands in this order:

- 1) /usr/local/bin
- 2) /usr/bin
- 3) /usr/local/sbin
- 4) /usr/sbin
- 5) /home/cis90/simben/./bin
- 6) /home/cis90/simben/bin
- 7) .

yes, . is a directory too and it is whatever directory you are currently in

Activity

```
/home/cis90/simben $ echo I love Linux
I love Linux
```

```
/home/cis90/simben $ route
```

```
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref    Use Iface
default          nosweat.cis.cab 0.0.0.0         UG    100   0      0 ens32
172.30.5.0      0.0.0.0         255.255.255.0  U    100   0      0 ens32
```

```
/home/cis90/simben $ who
```

```
simben90 pts/0      2017-09-08 14:45 (localhost)
rsimms pts/2      2017-09-08 11:52 (c-71-198-222-56.hsd1.ca.comcast.net)
cis90 pts/25     2017-09-06 13:43 (2607:f380:80f:f830::90:119)
```

```
/home/cis90/simben $ gotd
```

and that's all there is to it.

```
/home/cis90/simben $ hi
```

```
Welcome to Introduction to UNIX/Linux,
simben90
```

```
/home/cis90/simben $ timecal
```

Sun Sep 9 17:06:32 PDT 2018

```

      August 2018          September 2018          October 2018
Su Mo Tu We Th Fr Sa  Su Mo Tu We Th Fr Sa  Su Mo Tu We Th Fr Sa
      1 2 3 4           1 2 3 4           1 2 3 4 5 6
 5 6 7 8 9 10 11      2 3 4 5 6 7 8           7 8 9 10 11 12 13
12 13 14 15 16 17 18  9 10 11 12 13 14 15      14 15 16 17 18 19 20
19 20 21 22 23 24 25  16 17 18 19 20 21 22  21 22 23 24 25 26 27
26 27 28 29 30 31     23 24 25 26 27 28 29  28 29 30 31
                        30
```

```
/home/cis90/simben $ scavenge
```

```
#####
# S C A V E N G E R H U N T #
#####
snipped
```

Try each of these commands on Opus-II.

When finished type the output from running the gotd command into the chat window.

Activity

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

*What directory contains the **echo** command?*

Put your answer in the chat window.

Activity

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

- 1) What directory contains the **route** command?
- 2) How many directories must the shell search to find this command?

Put your answers in the chat window.

Activity

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

- 1) *What directory contains the **who** command?*
- 2) *How many directories must the shell search to find this command?*

Put your answers in the chat window.

Activity

```
/home/cis90/simben $ echo $PATH
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal
echo is a shell builtin
route is /usr/sbin/route
who is hashed (/usr/bin/who)
scavenge is /usr/local/bin/scavenge
qotd is /home/cis90/simben/../../bin/qotd
hi is /home/cis90/simben/bin/hi
timecal is ./timecal
```

- 1) What directory contains the **scavenge** command?
- 2) How many directories must the shell search to find this command?

Put your answers in the chat window.

Activity

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

- 1) What directory contains the **qotd** command?
- 2) How many directories must the shell search to find this command?

Put your answers in the chat window.

Activity

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

- 1) *What directory contains the **hi** command?*
- 2) *How many directories must the shell search to find this command?*

Put your answers in the chat window.

Activity

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

- 1) What directory contains the **timecal** command?
- 2) How many directories must the shell search to find this command?

Put your answers in the chat window.

Answers

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:  
/home/cis90/simben/../../bin:/home/cis90/simben/bin:.
```

```
/home/cis90/simben $ type echo route who scavenge qotd hi timecal  
echo is a shell builtin  
route is /usr/sbin/route  
who is hashed (/usr/bin/who)  
scavenge is /usr/local/bin/scavenge  
qotd is /home/cis90/simben/../../bin/qotd  
hi is /home/cis90/simben/bin/hi  
timecal is ./timecal
```

- 1) echo - is built into the shell and is not is a directory.
- 2) route - is found in the 4th directory, **/usr/sbin**.
- 3) who - is found in the 2nd directory, **/usr/bin**.
- 4) scavenge - is found in the 1st directory, **/usr/local/bin**.
- 5) qotd - is found in the 5th directory, **/home/cis90/xxxxxx/../../bin**.
- 6) hi - is found in the 6th directory, **/home/cis90/xxxxxx/bin**.
- 7) timecal - is found in the 7th directory, **.** (the directory you are in).

xxxxxx is your username on Opus-II without the ending "90".

Activity

Show your path

```
/home/cis90/simben $ echo $PATH  
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/cis9  
0/simben/./bin:/home/cis90/simben/bin:.
```

Now break your path by removing all the directories!

```
/home/cis90/simben $ PATH=""  
/home/cis90/simben $ echo $PATH
```

Try each of the following commands:

```
echo  
route  
who  
qotd  
hi  
timecal  
scavenge
```

Type the commands that work in the chat window

No path now!

```
✓ /home/cis90/simben $ PATH=" "  
/home/cis90/simben $ echo I love Linux  
I love Linux  
/home/cis90/simben $ route  
-bash: route: command not found  
/home/cis90/simben $ who  
-bash: who: command not found  
/home/cis90/simben $ qotd  
-bash: qotd: command not found  
/home/cis90/simben $ hi  
-bash: hi: command not found  
/home/cis90/simben $ timecal  
-bash: timecal: command not found  
/home/cis90/simben $ scavenge  
-bash: scavenge: command not found
```

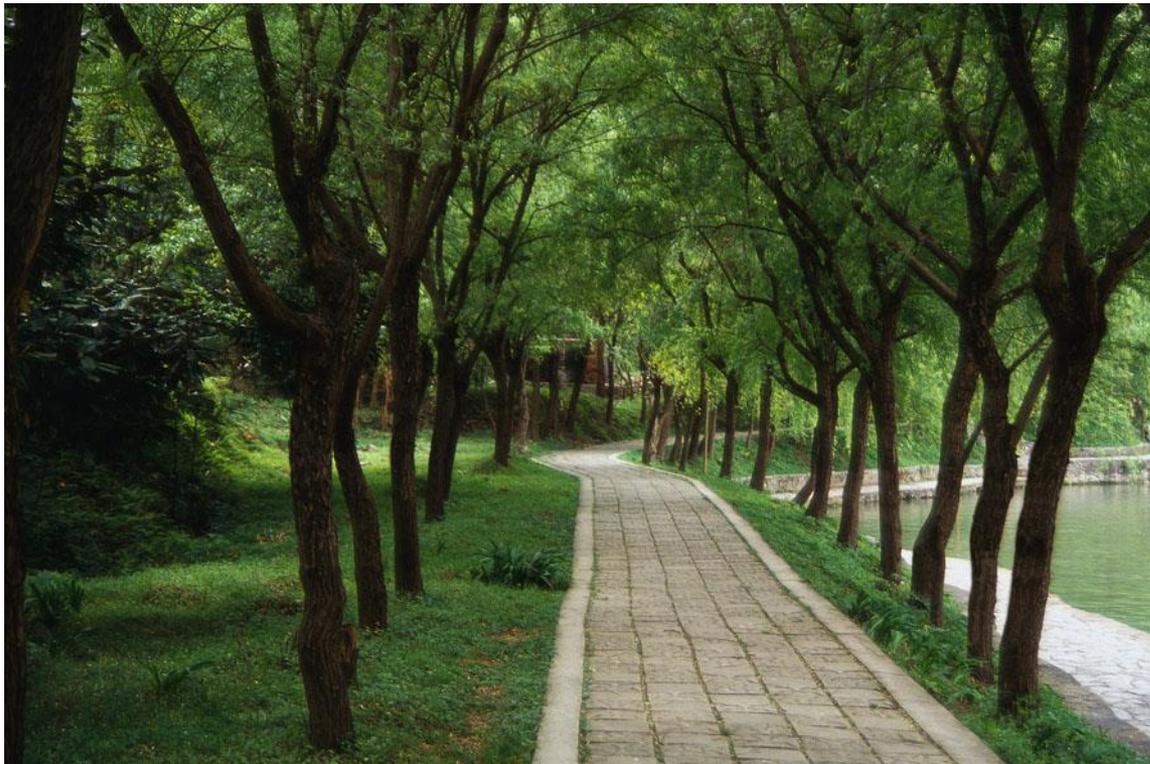
*Only **echo** works because it is built into the shell.*

*The **other** commands are still in their directories but since those directories are no longer on the path the shell does not find them!*



```
/home/cis90/simben $ echo $PATH
```

```
/home/cis90/simben $
```



There is nothing on the path!

Activity

Add the /usr/bin directory to the path

```
/home/cis90/simben $ PATH=/usr/bin  
/home/cis90/simben $ echo $PATH  
/usr/bin
```

Try each of the following commands:

```
echo  
route  
who  
qotd  
hi  
timecal  
scavenge
```

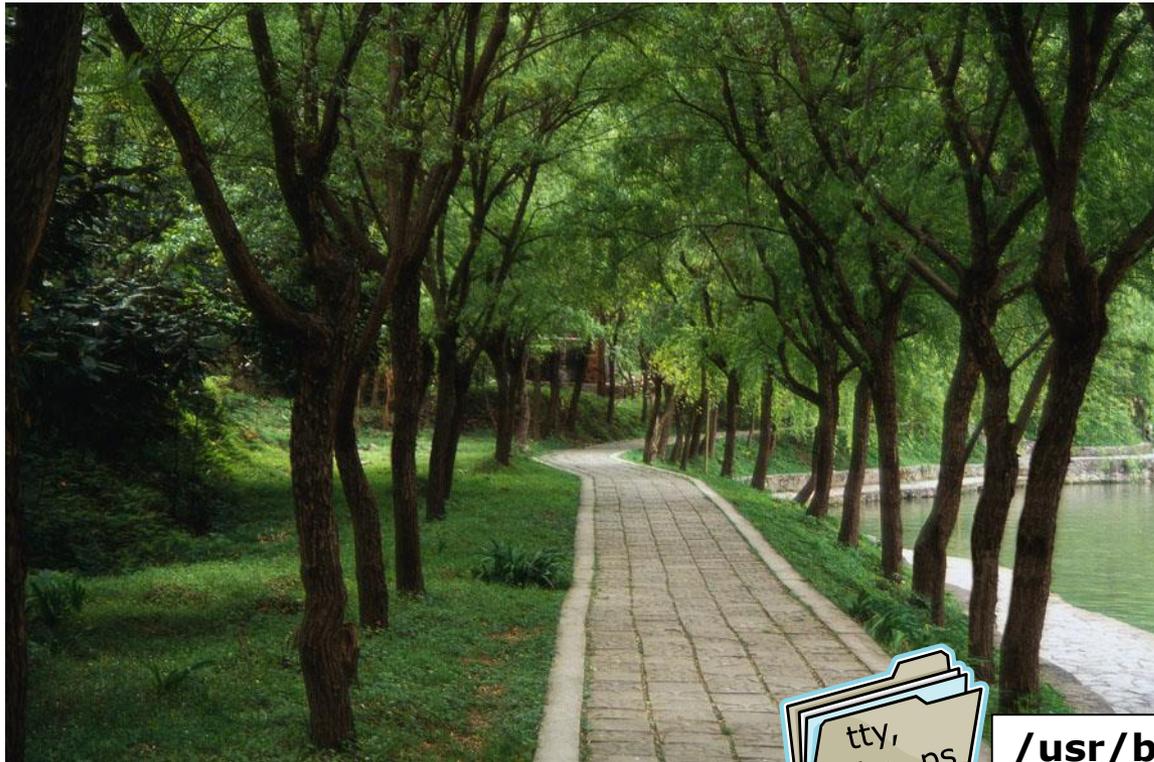
Type the commands that work in the chat window

`/usr/bin` added to path

```
✓ /home/cis90/simben $ echo I love Linux
I love Linux
/home/cis90/simben $ route
-bash: route: command not found
✓ /home/cis90/simben $ who
simben90 pts/4          2018-09-09 17:48 (c-73-222-184-235.hsd1.ca.comcast.net)
/home/cis90/simben $ qotd
-bash: qotd: command not found
/home/cis90/simben $ hi
-bash: hi: command not found
/home/cis90/simben $ timecal
-bash: timecal: command not found
/home/cis90/simben $ scavenge
-bash: scavenge: command not found
```

Some progress! Both echo and who commands work now!

```
/home/cis90/simben $ echo $PATH  
/usr/bin  
/home/cis90/simben $
```



Note the path has the /usr/bin directory on it

Activity

Add the /usr/sbin directory to the path

```
/home/cis90/simben $ PATH=/usr/bin:/usr/sbin  
/home/cis90/simben $ echo $PATH  
/usr/bin:/usr/sbin
```

Try each of the following commands:

```
echo  
route  
who  
qotd  
hi  
timecal  
scavenge
```

Type the commands that work in the chat window

Note: alternatively you could have appended /usr/sbin to the current path using:

```
PATH=$PATH:/usr/sbin
```

/usr/bin and /usr/sbin added to path

✓ /home/cis90/simben \$ **echo I love Linux**

I love Linux

✓ /home/cis90/simben \$ **route**

Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
default	nosweat.cis.cab	0.0.0.0	UG	100	0	0	ens32
172.30.5.0	0.0.0.0	255.255.255.0	U	100	0	0	ens32

✓ /home/cis90/simben \$ **who**

simben90 pts/4 2018-09-09 17:48 (c-73-222-184-235.hsd1.ca.comcast.net)

/home/cis90/simben \$ **qotd**

-bash: qotd: command not found

/home/cis90/simben \$ **hi**

-bash: hi: command not found

/home/cis90/simben \$ **timecal**

-bash: timecal: command not found

/home/cis90/simben \$ **scavenge**

-bash: scavenge: command not found

More progress! Now echo, route and who commands work!

```
/home/cis90/simben $ echo $PATH  
/usr/bin:/usr/sbin
```



Not the path has the /usr/bin and /usr/sbin directories on it

Activity

Add the /usr/local/bin directory to the path

```
/home/cis90/simben $ PATH=/usr/bin:/usr/sbin:/usr/local/bin  
/home/cis90/simben $ echo $PATH  
/usr/bin:/usr/sbin:/usr/local/bin
```

Try each of the following commands:

```
echo  
route  
who  
qotd  
hi  
timecal  
scavenge
```

Type the commands that work in the chat window

Note: alternatively you could have appended /usr/local/bin to the current path using:
PATH=\$PATH:/usr/local/bin

/usr/bin and /usr/sbin added to path

✓ /home/cis90/simben \$ **echo I love Linux**

I love Linux

✓ /home/cis90/simben \$ **route**

Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
default	nosweat.cis.cab	0.0.0.0	UG	100	0	0	ens32
172.30.5.0	0.0.0.0	255.255.255.0	U	100	0	0	ens32

✓ /home/cis90/simben \$ **who**

simben90 pts/4 2018-09-09 17:48 (c-73-222-184-235.hsdl.ca.comcast.net)

/home/cis90/simben \$ **qotd**

-bash: qotd: command not found

/home/cis90/simben \$ **hi**

-bash: hi: command not found

/home/cis90/simben \$ **timecal**

-bash: timecal: command not found

✓ /home/cis90/simben \$ **scavenge**

```
#####
#   S C A V E N G E R   H U N T   #
#####
snipped
```

More progress! Now echo, route and who commands work!

```
/home/cis90/simben $ echo $PATH  
/usr/bin:/usr/sbin:/usr/local/bin
```



Not the path has the /usr/bin, /usr/sbin and /usr/local/bin directories on it

Continue fixing the Path

The **qotd** command is in */home/cis90/bin*

The **hi** command is in */home/cis90/xxxxxx/bin*
(*xxxxxx is your username without the "90"*)

The **timecal** command is in the directory you are in right now

What **PATH=???????????????** command could be issued so **qotd**, **hi** and **timecal** commands all work?

Put your best guess in the chat window

Activity

Try this

```
/home/cis90/simben $ echo $PATH  
/usr/bin:/usr/sbin:/usr/local/bin  
/home/cis90/simben $ echo $HOME  
/home/cis90/simben  
/home/cis90/simben $ PATH=$PATH:/home/cis90/bin:$HOME/bin/..
```

Try each of the following commands:

```
echo  
route  
who  
qotd  
hi  
timecal  
scavenge
```

Type the commands that work in the chat window

The PATH has been completely fixed!

✓ /home/cis90/simben \$ **echo I love Linux**
I love Linux

✓ /home/cis90/simben \$ **route**
Kernel IP routing table

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
default	nosweat.cis.cab	0.0.0.0	UG	100	0	0	ens32
172.30.5.0	0.0.0.0	255.255.255.0	U	100	0	0	ens32

✓ /home/cis90/simben \$ **who**

```
simben90 pts/0      2017-09-08 14:45 (localhost)
rsimms    pts/2      2017-09-08 11:52 (c-71-198-222-56.hsd1.ca.comcast.net)
cis90    pts/25     2017-09-06 13:43 (2607:f380:80f:f830::90:119)
```

*All commands
are working
again!*

✓ /home/cis90/simben \$ **qotd**
and that's all there is to it.

✓ /home/cis90/simben \$ **hi**
Welcome to Introduction to UNIX/Linux,
simben90



✓ /home/cis90/simben \$ **timecal**
Sun Sep 9 17:06:32 PDT 2018

```

August 2018          September 2018          October 2018
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
      1  2  3  4          1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
5  6  7  8  9 10 11    2  3  4  5  6  7  8          1  2  3  4  5  6
12 13 14 15 16 17 18    9 10 11 12 13 14 15          7  8  9 10 11 12 13
19 20 21 22 23 24 25    16 17 18 19 20 21 22          14 15 16 17 18 19 20
26 27 28 29 30 31      23 24 25 26 27 28 29          21 22 23 24 25 26 27
                          30
                          28 29 30 31

```

✓ /home/cis90/simben \$ **scavenge**

```
#####
#  S C A V E N G E R  H U N T  #
#####
snipped
```



*Need a fresh start -- just log out
and back in again and your path
will be back to normal!*