

# 10 - Bash Scripting III, Git Merging and Diffs

CS 2043: Unix Tools and Scripting, Spring 2016 [1]

---

Stephen McDowell

February 19th, 2016

Cornell University

# Table of contents

1. More on Conditions

2. Git Tools

## Some Logistics

- (poll) are you confused about how to access the various resources in the class?

## Some Logistics

- (poll) are you confused about how to access the various resources in the class?
- Review of variables.

## Some Logistics

- (poll) are you confused about how to access the various resources in the class?
- Review of variables.
- Sorry about today...

## Some Logistics

- (poll) are you confused about how to access the various resources in the class?
- Review of variables.
- Sorry about today...
- ...I wanted to get your HW to you. That will happen tonight.

## More on Conditions

---

# Case

- Just like a switch statement in other languages, only better.



# Case

- Just like a switch statement in other languages, only better.
- Does not carry on to all cases if you forget that **break** keyword.

# Case

- Just like a switch statement in other languages, only better.
- Does not carry on to all cases if you forget that **break** keyword.

```
case "$var" in
  "A" )
    cmds to execute for case "A"
    ;;
  "B" )
    cmds to execute for case "B"
    ;;
  * )
    cmds for DEFAULT (not matched) case
    ;;
esac
```

# Case

- Just like a switch statement in other languages, only better.
- Does not carry on to all cases if you forget that **break** keyword.

```
case "$var" in
  "A" )
    cmds to execute for case "A"
    ;;
  "B" )
    cmds to execute for case "B"
    ;;
  * )
    cmds for DEFAULT (not matched) case
    ;;
esac
```

- Basically just shorthand for **if-elif-else...**

# Case

- Just like a switch statement in other languages, only better.
- Does not carry on to all cases if you forget that **break** keyword.

```
case "$var" in
  "A" )
    cmds to execute for case "A"
    ;;
  "B" )
    cmds to execute for case "B"
    ;;
  * )
    cmds for DEFAULT (not matched) case
    ;;
esac
```

- Basically just shorthand for **if-elif-else...**
- ...only not!

## Simple If and Case Examples

- Suppose we wanted to make a simple program to print between 0 and 2 **blarghs**.

## Simple If and Case Examples

- Suppose we wanted to make a simple program to print between 0 and 2 **blarghs**.
- Assume that the input to the script is **\$1**.

## Simple If and Case Examples

- Suppose we wanted to make a simple program to print between 0 and 2 **blarghs**.
- Assume that the input to the script is **\$1**.
- We don't need to check because it will just not match.

# Simple If and Case Examples

- Suppose we wanted to make a simple program to print between 0 and 2 **blarghs**.
- Assume that the input to the script is **\$1**.
- We don't need to check because it will just not match.

```
#!/bin/bash
#
# (empty to fill space in minted)
# (empty to fill space in minted)
#
if [[ "$1" == "0" ]]; then
    echo "0 blargh echoes..."
elif [[ "$1" == "1" ]]; then
    echo "1 blargh echoes..."
    echo "    [1] blargh"
# number or string
elif [[ "$1" -eq 2 ]]; then
    echo "2 blargh echoes..."
    echo "    [1] blargh"
    echo "    [2] blargh"
else
    echo "Blarghs come in [0-2]."
    exit 1
fi
```



# Simple If and Case Examples

- Suppose we wanted to make a simple program to print between 0 and 2 **blarghs**.
- Assume that the input to the script is **\$1**.
- We don't need to check because it will just not match.

```
#!/bin/bash
#
# (empty to fill space in minted)
# (empty to fill space in minted)
#
if [[ "$1" == "0" ]]; then
    echo "0 blargh echoes..."
elif [[ "$1" == "1" ]]; then
    echo "1 blargh echoes..."
    echo " [1] blargh"
# number or string
elif [[ "$1" -eq 2 ]]; then
    echo "2 blargh echoes..."
    echo " [1] blargh"
    echo " [2] blargh"
else
    echo "Blarghs come in [0-2]."
    exit 1
fi
```

```
#!/bin/bash
case "$1" in
    "0" )
        echo "0 blargh echoes..."
        ;;
    "1" )
        echo "1 blargh echoes..."
        echo " [1] blargh"
        ;;
    # number or string
    2 )
        echo "2 blargh echoes..."
        echo " [1] blargh"
        echo " [2] blargh"
        ;;
    * )
        echo "Blarghs come in [0-2]."
        exit 1
        ;;
esac
```

## Case and If Comparisons

- The matching strategy is different for **case** than **if**.

## Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. **"A"** is just an explicit pattern.

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].
  - By default, **if** statements are comparing *values*.

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].
  - By default, **if** statements are comparing values.
    - To use *extended regular expressions* in **if** statements, you need to use the `=~` operator.

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].
  - By default, **if** statements are comparing values.
    - To use *extended regular expressions* in **if** statements, you need to use the `=~` operator.
    - In most **bash**, the expression on the *right* is treated as an *extended regular expression*.



# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].
  - By default, **if** statements are comparing values.
    - To use *extended regular expressions* in **if** statements, you need to use the `=~` operator.
    - In most **bash**, the expression on the *right* is treated as an *extended* regular expression.
    - Not for all pre-4.0, pull up **man bash** and search for `=~`.

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].
  - By default, **if** statements are comparing values.
    - To use *extended regular expressions* in **if** statements, you need to use the `=~` operator.
    - In most **bash**, the expression on the *right* is treated as an *extended* regular expression.
    - Not for all pre-4.0, pull up **man bash** and search for `=~`.
    - Remember to search in the man page type `/expr to search` and hit **enter**.

# Case and If Comparisons

- The matching strategy is different for **case** than **if**.
  - By default, **case** statements are comparing *patterns*.
    - Note that a single value e.g. "A" is just an explicit pattern.
    - Patterns are NOT regular expressions. Refer to [2].
  - By default, **if** statements are comparing values.
    - To use *extended regular expressions* in **if** statements, you need to use the `=~` operator.
    - In most **bash**, the expression on the *right* is treated as an *extended* regular expression.
    - Not for all pre-4.0, pull up **man bash** and search for `=~`.
    - Remember to search in the man page type `/expr to search` and hit **enter**.
    - Cycle through the results with **n** for next search result.

## Using Sets with **case**

- **case** with the set **[0-9]**:

## Using Sets with **case**

- **case** with the set **[0-9]**:

```
#!/bin/bash
case "$1" in
  [[:digit:]] )
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
      echo "  [$i] blargh"
    done
    ;;
  * )
    echo "Blarghs only come in [0-9]."
    exit 1
    ;;
esac
```

## Using Sets with **case**

- **case** with the set **[0-9]**:

```
#!/bin/bash
case "$1" in
  [[:digit:]] )
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
      echo "  [$i] blargh"
    done
    ;;
  * )
    echo "Blarghs only come in [0-9]."
    exit 1
    ;;
esac
```

- This will work on inputs **0-9**, as well as exit for everything else.

## Using Sets with **case**

- **case** with the set **[0-9]**:

```
#!/bin/bash
case "$1" in
  [[:digit:]] )
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
      echo "  [$i] blargh"
    done
    ;;
  * )
    echo "Blarghs only come in [0-9]."- exit 1
  ;;
esac

```

- This will work on inputs **0-9**, as well as exit for everything else.
- It will not match **11**, because that is not in the **set**.

## Using Sets with **case**

- **case** with the set **[0-9]**:

```
#!/bin/bash
case "$1" in
  [[:digit:]] )
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
      echo "  [$i] blargh"
    done
    ;;
  * )
    echo "Blarghs only come in [0-9]."
    exit 1
    ;;
esac
```

- This will work on inputs **0-9**, as well as exit for everything else.
- It will not match **11**, because that is not in the **set**.
- Refer to [2] for the extent of what you can do with **case**.



## Using Sets with **case**

- **case** with the set **[0-9]**:

```
#!/bin/bash
case "$1" in
  [[:digit:]] )
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
      echo "  [$i] blargh"
    done
    ;;
  * )
    echo "Blarghs only come in [0-9]."
    exit 1
    ;;
esac
```

- This will work on inputs **0-9**, as well as exit for everything else.
- It will not match **11**, because that is not in the **set**.
- Refer to [2] for the extent of what you can do with **case**.
- It should now make more sense why **\*** being last is equivalent to **default**.

## Using Sets with **case**

- **case** with the set **[0-9]**:

```
#!/bin/bash
case "$1" in
  [[:digit:]] )
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
      echo "  [$i] blargh"
    done
    ;;
  * )
    echo "Blarghs only come in [0-9]."
    exit 1
    ;;
esac
```

- This will work on inputs **0-9**, as well as exit for everything else.
- It will not match **11**, because that is not in the **set**.
- Refer to [2] for the extent of what you can do with **case**.
- It should now make more sense why **\*** being last is equivalent to **default**.
  - Careful it actually is last!

## Using Sets with **if**

- Lets use the same example:

# Using Sets with `if`

- Lets use the same example:

```
#!/bin/bash
if [[ "$1" =~ [[:digit:]] ]]; then
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
        echo "  [$i] blargh"
    done
else
    echo "Blarghs only come in [0-9]."
```

exit 1

```
fi
```

# Using Sets with `if`

- Lets use the same example:

```
#!/bin/bash
if [[ "$1" =~ [[:digit:]] ]]; then
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
        echo "  [$i] blargh"
    done
else
    echo "Blarghs only come in [0-9]."
    exit 1
fi
```

- Works on `[0-9]`.

# Using Sets with `if`

- Lets use the same example:

```
#!/bin/bash
if [[ "$1" =~ [[:digit:]] ]]; then
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
        echo "  [$i] blargh"
    done
else
    echo "Blarghs only come in [0-9]."
    exit 1
fi
```

- Works on `[0-9]`.
- Cool! Works on `99`.

# Using Sets with `if`

- Lets use the same example:

```
#!/bin/bash
if [[ "$1" =~ [[:digit:]] ]]; then
    echo "$1 blargh echoes..."
    for (( i = 1; i <= $1; i++ )); do
        echo "  [$i] blargh"
    done
else
    echo "Blarghs only come in [0-9]."
```

```
    exit 1
```

```
fi
```

- Works on `[0-9]`.
- Cool! Works on `99`.
- Whoops! Works on `208a` - the `for` loop crashes.

## The $\equiv$ Operator

- Option 1 - negate a negation:



# The =~ Operator

- Option 1 - negate a negation:

```
#           +-----+
#           | invert set |
#           +-----+
#           |
if [[ ! "$1" =~ [^[:digit:]] ]; then
```

# The =~ Operator

- Option 1 - negate a negation:

```
#           +-----+
#           | invert set |
#           +-----+
#           |
if [[ ! "$1" =~ [^[:digit:]] ]; then
```

- Option 2 - use extended regular expressions:

# The =~ Operator

- Option 1 - negate a negation:

```
#          +-----+
#          | invert set |
#          +-----+
#          |
if [[ ! "$1" =~ [^[:digit:]] ]; then
```

- Option 2 - use extended regular expressions:

```
#          +-----+
#          | beginning of line |
#          +-----+
#          |
if [[ "$1" =~ ^[:digit:]+$ ]; then
#          |
# +-----+
# | 1 or more digit |-----+
# +-----+
# +-----+
# | $ matches end of line |
# +-----+
```

# Git Tools

---

# What is a Merge?

- What is a merge?

# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.

# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.
- When does it happen?

# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.
- When does it happen?
  - When **git** is merging two separate **commits**, either across branches *or* across forks.



# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.
- When does it happen?
  - When **git** is merging two separate **commits**, either across branches *or* across forks.
- Why does this matter?

# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.
- When does it happen?
  - When **git** is merging two separate **commits**, either across branches *or* across forks.
- Why does this matter?
  - **git** may know how to automatically merge (fast-forward)...

# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.
- When does it happen?
  - When **git** is merging two separate **commits**, either across branches *or* across forks.
- Why does this matter?
  - **git** may know how to automatically merge (fast-forward)...
  - ...or it won't (merge conflict).

# What is a Merge?

- What is a merge?
  - When **git** combines code bases that are divergent.
- When does it happen?
  - When **git** is merging two separate **commits**, either across branches *or* across forks.
- Why does this matter?
  - **git** may know how to automatically merge (fast-forward)...
  - ...or it won't (merge conflict).
- Lets go ahead and do one.

## Status and Differences

- What does `git status` do?

## Status and Differences

- What does `git status` do?
  - Informs us of changes in code, untracked files, etc.

## Status and Differences

- What does `git status` do?
  - Informs us of changes in code, untracked files, etc.
- Can we get more information when there are differences?

## Status and Differences

- What does `git status` do?
  - Informs us of changes in code, untracked files, etc.
- Can we get more information when there are differences?

```
>>> git diff
```



## Status and Differences

- What does `git status` do?
  - Informs us of changes in code, untracked files, etc.
- Can we get more information when there are differences?

```
>>> git diff
```

- Can we get some useful / readable information?

## Status and Differences

- What does `git status` do?
  - Informs us of changes in code, untracked files, etc.
- Can we get more information when there are differences?

```
>>> git diff
```

- Can we get some useful / readable information?

```
>>> git config --global diff.tool vimdiff  
>>> git config --global alias.d difftool  
# now 'git d' aliases to 'git difftool'
```

# Status and Differences

- What does `git status` do?
  - Informs us of changes in code, untracked files, etc.
- Can we get more information when there are differences?

```
>>> git diff
```

- Can we get some useful / readable information?

```
>>> git config --global diff.tool vimdiff  
>>> git config --global alias.d difftool  
# now 'git d' aliases to 'git difftool'
```

- Time for a forced merge conflict!

# References I

[1] B. Abrahao, H. Abu-Libdeh, N. Savva, D. Slater, and others over the years.

**Previous cornell cs 2043 course slides.**

[2] `gnu.org`.

**Bash reference manual: Pattern matching.**

`http://www.gnu.org/software/bash/manual/  
bashref.html#Pattern-Matching`.