ÖGOR Summer-Workshop for PhD-candidates and Post-Docs

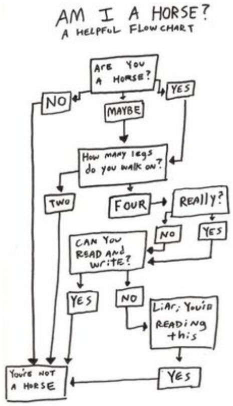
An introduction to Julia and JuMP for Operations Research

Prof. Dr. Xavier Gandibleux

Nantes Université – France
Département Informatique – Faculté des Sciences et Techniques

Topic 4

Control flow
The conditionals



if ... endif

Definition:

```
if condition
   instruction(s)
end
```

Example:

```
julia> if zipcode == 4020
          println("Welcome to Linz")
       end
```

if ... endif

Definition:

```
if condition
   instruction(s)
end
```

Example:

```
julia> if zipcode == 4020
          println("Welcome to Linz")
       end
```

if ... else ... endif (1/2)

```
if condition
   instruction(s) 1
else
   instruction(s) 2
end
```

```
julia> if zipcode == 4020
          println("Welcome to Linz")
       else
          println("Welcome to Austria")
       end
```

if ... else ... endif (2/2)

`ifelse` instruction:

```
ifelse( condition, case_true, case_false)
```

```
julia> println("Welcome to ",
         ifelse(zipcode == 4020, "Linz", "Austria")
       )
```

Ternary operator:

```
condition ?  case_true  :  case_false
```

```
julia> println("Welcome to ",
         zipcode == 4020 ?  "Linz"  :  "Austria")
       )
```

if ... else ... endif (2/2)

`ifelse` instruction:

```
ifelse( condition, case_true, case_false)
```

```
julia> println("Welcome to ",
         ifelse(zipcode == 4020, "Linz", "Austria")
       )
```

Ternary operator:

```
condition ?  case_true  :  case_false
```

```
julia> println("Welcome to ",
         zipcode == 4020 ?  "Linz" :  "Austria")
       )
```

if ... elsif ... [else ...] endif

```
if condition 1
   instruction(s) 1
elsif condition 2
   instruction(s) 2
else
   instruction(s) n+1
end
```

```
julia> if zipcode == 4020
          println("Welcome to Linz Central area")
       elsif zipcode == 4030
          println("Welcome to Linz South area")
       elsif zipcode == 4040
          println("Welcome to Linz North area")
       else
          println("Welcome to Austria")
       end
```

Logical operators

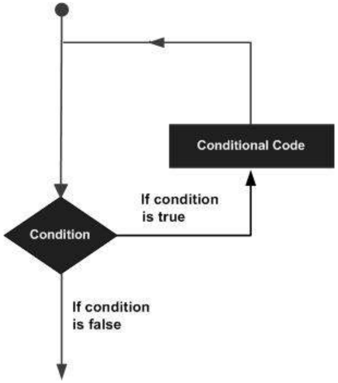
With `a` and `b`, two logical conditions:

Operator	*Expression*	*Signification*
`!`	`!a`	NOT a
`&&`	`a && b`	a AND (then) b
`||`	`a || b`	a OR (else) b

Example:

```
julia> countrycode == "AT" && zipcode == 4020
```

Control flow
Loops



while ... endWhile

Definition:

```
while condition
    instruction(s)
end
```

Example:

```
julia> zipcode = 4020
       while zipcode <= 4040
          print(zipcode, " ")
          zipcode = zipcode + 10
       end
```

while ... endWhile

Definition:

```
while condition
    instruction(s)
end
```

Example:

```
julia> zipcode = 4020
       while zipcode <= 4040
          print(zipcode, " ")
          zipcode = zipcode + 10
       end
```

for ... endFor (1/3)

Definition:

```
for variable in collection
    instruction(s)
end
```

Also:

```
for variable = collection
for variable ∈ collection
```

Collection:

- range: `start:stop` or `start:step:stop`
- string: `"characters"`
- tuple: (*val*$_1$, *val*$_2$, ..., *val*$_n$)
- array: [*val*$_1$, *val*$_2$, ..., *val*$_n$]
- set: Set([*val*$_1$, *val*$_2$, ..., *val*$_n$])
- dict: Dict(*key*$_1$=>*val*$_1$,*key*$_2$=>*val*$_2$, ..., *key*$_n$=>*val*$_n$)

for ... endFor (1/3)

Definition:

```
for variable in collection
    instruction(s)
end
```

Also:

```
for variable = collection
for variable ∈ collection
```

Collection:

- range: `start:stop` or `start:step:stop`
- string: `"characters"`
- tuple: (*val*$_1$, *val*$_2$, ..., *val*$_n$)
- array: [*val*$_1$, *val*$_2$, ..., *val*$_n$]
- set: Set([*val*$_1$, *val*$_2$, ..., *val*$_n$])
- dict: Dict(*key*$_1$=>*val*$_1$,*key*$_2$=>*val*$_2$, ..., *key*$_n$=>*val*$_n$)

for ... endFor (1/3)

Definition:

```
for variable in collection
    instruction(s)
end
```

Also:

```
for variable = collection
for variable ∈ collection
```

Collection:

- range: `start:stop` or `start:step:stop`
- string: `"characters"`
- tuple: $(val_1, val_2, \ldots, val_n)$
- array: $[val_1, val_2, \ldots, val_n]$
- set: $\text{Set}([val_1, val_2, \ldots, val_n])$
- dict: $\text{Dict}(key_1{=>}val_1, key_2{=>}val_2, \ldots, key_n{=>}val_n)$

for ... endFor (1/3)

Definition:

```
for variable in collection
    instruction(s)
end
```

Also:

```
for variable = collection
for variable ∈ collection
```

Collection:

- range: `start:stop` or `start:step:stop`
- string: `"characters"`
- tuple: `(`val_1`, `val_2`, ..., `val_n`)`
- array: `[`val_1`, `val_2`, ..., `val_n`]`
- set: `Set([`val_1`, `val_2`, ..., `val_n`])`
- dict: `Dict(`key_1`=>`val_1`,`key_2`=>`val_2`, ..., `key_n`=>`val_n`)`

for ... endFor (2/3)

Examples:

```
julia> for i in 1:10
          print(i , " ")
       end
```

```
julia> for i in 1:2:10
          print(i , " ")
       end
```

```
julia> for i in "Linz"
          print(i , " ")
       end
```

for ... endFor (3/3)

```
julia> for i in (4020,4030,4040)
          print(i , " ")
       end
```

```
julia> for i in [4020,4030,4040]
          print(i , " ")
       end
```

```
julia> for i in Set([4020,4030,4040])
          print(i , " ")
       end
```

```
julia> for i in Dict("Center"=>4020,"South"=>4030,
                                    "North"=>4040)
          print(i , " ")
       end
```

Multiple for ... endFor

```
for $var_1$ in $collection_1$
   for $var_2$ in $collection_2$
      instruction(s)
   end
end
```

```
for $var_1$ in $collection_1$, $var_2$ in $collection_2$
  instruction(s)
end
```

Example:

```
julia> for i in 1:3, j in "hello"
          println(i, " ", j)
       end
```

Multiple for ... endFor

```
for $var_1$ in $collection_1$
   for $var_2$ in $collection_2$
      $instruction(s)$
   end
end
```

```
for $var_1$ in $collection_1$, $var_2$ in $collection_2$
  $instruction(s)$
end
```

Example:

```
julia> for i in 1:3, j in "hello"
          println(i, " ", j)
       end
```