Workshop: High-performance computing for economists

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Basic subroutine programming

Goal

- Show the basics of proper subroutine programming
- Advantages, pitfalls
- Examples in R
- Tomorrow: generalization and differences in other programming languages

Control structures in programming languages

Mostly generic

- `if, else`: testing a condition [R, SAS]
- `for`: execute a loop a fixed number of times [R, in SAS: `do`]
- `while`: execute a loop while a condition is true [R,SAS]
- `until`: execute a loop until a condition is true [SAS]
- `repeat`: execute an infinite loop [R]
- `break`: break the execution of a loop [R, SAS]
- `next`: skip an interation of a loop [R]
- `return`: exit a function [R]

Control structures: if

Control structures: if

... in R

```
if(<condition>) {
## do something
} else {
## do something else
}
if(<condition1>) {
## do something
} else if(<condition2>) {
## do something different
} else {
## do something different
}
```

Control structures: if

... in R

```
1  if(<condition>) {
2  ## do something
3  } else {
4  ## do something else
5  }
6  if(<condition1>) {
7  ## do something
8  } else if(<condition2>) {
9  ## do something different
10 } else {
11 ## do something different
12 }
```

... in SAS

```
1  if (<condition>) then do;
2  ## do something
3  end; else do;
4  ## do something else
5  end;
6  if (<condition1>) then do;
7  ## do something
8  else if (<condition2>) then do;
9  ## do something different
10 end; else do;
11 ## do something different
12 end;
```

Control structures: for

Run through a fixed sequence of numbers (or in R, a sequence of vectors)

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simple loop in R

```
1  for(i in 1:10) {
2  print(i)
3  }
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Run through a fixed sequence of numbers (or in R, a sequence of vectors)

simple loop in R

```
1  for(i in 1:10) {
2  print(i)
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```

... in SAS

```
1  do i = 1 to 10;
2  put i;
3  end;
```

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Equivalent loops in R

```
1  x <- c("a", "b", "c", "d")
2  for(i in 1:4) {
3  print(x[i])
4  }
5  for(i in x) {
6  print(i)
7  }
8  for(i in 1:4) print(x[i])
```

... in SAS

```
1  do i = 1 to 10;
2  put i;
3  end;
```