



Nested Data Structures

Arrays and Hashes

Nested Data Structures

- Accessing values
- Ambiguity in complex array structures

Example of a Nested Array

- Grids with rows and columns

```
row_1 = [ "-", "-", "X"]  
row_2 = [ "-", "0", "X"]  
row_3 = [ "-", "-", "0"]
```

Example of a Nested Array

- Grids with rows and columns

```
tic_tac_toe = [[ "-", "-", "X"],  
               [ "-", "0", "X"],  
               [ "-", "-", "0"]]
```

Example of a Nested Hash

- Hierarchy with named attributes

```
freda = { age: 27 }  
fred  = { age: 25 }
```

Example of a Nested Hash

- Hierarchy with named attributes

```
foxes = { freda: { age: 27 },  
         fred:  { age: 25 } }
```

Example of a Nested Hash

- Hierarchy with named attributes

```
cohorts = {  
  foxes: { freda: { age: 27 },  
           fred:  { age: 25 } },  
  otters: { olivia: { age: 24 },  
            oliver: { age: 29 } }  
}
```

Accessing Values

- How do we dive into these structures?

Method Chaining

- `“STRING”.downcase.reverse.capitalize`
=> `“Gnirts”`

Method Chaining

- “STRING”.**downcase**.reverse.capitalize

“STRING”.downcase # => “**string**”

Method Chaining

- “STRING”.**downcase**.**reverse**.capitalize

“STRING”.downcase # => “string”

“**string**”.reverse # => “**gnirts**”

Method Chaining

- “STRING”.**downcase**.**reverse**.**capitalize**

“STRING”.downcase # => “string”

“string”.reverse # => “gnirts”

“**gnirts**”.capitalize # => “**Gnirts**”

Access Values in a Nested Array

- Find square in tic-tac-toe board

```
tic_tac_toe = [[ "-", "-", "X"],  
               [ "-", "0", "X"],  
               [ "-", "-", "0"]]
```

Access Values in a Nested Array

- `tic_tac_toe.at(1).at(2)`

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```
tic_tac_toe.at(1)  # => [ "-", "0", "X"]
```

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- `tic_tac_toe.at(1).at(2)`

```
tic_tac_toe.at(1) # => [ "-", "0", "X"]  
[ "-", "0", "X"].at(2) # => "X"
```


Access Values in a Nested Array

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```
tic_tac_toe = [[ "-", "-", "X"],  
               [ "-", "0", "X"],  
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```

Access Values in a Nested Array

- `tic_tac_toe[1][2]`

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tic_tac_toe = [[ "-", "-", "X"],  
               [ "-", "0", "X"],  
               [ "-", "-", "0"]]
```

Access Values in a Nested Array

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               [ "-", "0", "X"],  
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```

Access Values in a Nested Hash

- The age of a student in a cohort

```
cohorts = {  
  foxes: { freda: { age: 27 },  
          fred:  { age: 25 } },  
  otters: { olivia: { age: 24 },  
            oliver: { age: 29 } }  
}
```

Access Values in a Nested Hash

- `cohorts.fetch(:foxes).fetch(:freda).fetch(:age)`

```
cohorts = {  
  foxes: { freda: { age: 27 },  
          fred:  { age: 25 } },  
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Access Values in a Nested Hash

- `cohorts[:foxes][:freda][:age]`

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```

Ambiguity in Complex Arrays

- How do you access elements in an array?

Ambiguity in Complex Arrays

- How do you access elements in an array?

by index

Ambiguity in Complex Arrays

- Indexes are like poorly named variables

Ambiguity in Complex Arrays

team			
number	name	position	points per game
12	Joe Schmo	Center	[14, 32, 7, 0, 23]
9	Ms. Buckets	Point Guard	[19, 0, 11, 22, 0]
31	Harvey Kay	Shooting Guard	[0, 30, 16, 0, 25]
18	Sally Talls	Power Forward	[18, 29, 26, 31, 19]
22	MK DiBoux	Small Forward	[11, 0, 23, 17, 0]

Ambiguity in Complex Arrays

```
team = [[“number”, “name”, “position”, “points per game”],  
        [12, “Joe Schmo”, “Center”, [14, 32, 7, 0, 23],  
        [9, “Ms. Buckets”, “Point Guard”, [19, 0, 11, 22, 0],  
        [31, “Harvey Kay”, “Shooting Guard”, [0, 30, 16, 0, 25],  
        [18, “Sally Talls”, “Power Forward”, [18, 29, 26, 31, 19],  
        [22, “MK DiBoux”, “Small Forward”, [11, 0, 23, 17, 0]]
```

Ambiguity in Complex Arrays

- How do I get the data for Sally Talls?

Ambiguity in Complex Arrays

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`team[4]`

Ambiguity in Complex Arrays

- What position does Ms. Buckets play?
- What number does Harvey Kay wear?
- How many points did Joe Schmo score in Game 3?

Ambiguity in Complex Arrays

- What values do these return?

`team[2][0]`

`team[5][3][0]`

`team[3][2]`

Hashes Provide Informative Labels

```
team = { "joe schmo" => { "number" => 12,  
                           "position" => "Center",  
                           "points per game" => { "1" => 14,  
                                                    "2" => 32,  
                                                    "3" => 7,  
                                                    "4" => 0,  
                                                    "5" => 23 } },  
         "Ms. Buckets" => { ... },  
         "Harvey Kay"   => { ... },  
         "Sally Talls"  => { ... },  
         "MK DiBoux"    => { ... } }
```

Hashes Provide Informative Labels

- What values do these return?

`team[2][0]`

`team[5][3][0]`

`team[3][2]`

Hashes Provide Informative Labels

- Nested arrays vs. nested hashes

`team[2][0]`

`team["Ms. Buckets"]["number"]`

Hashes Provide Informative Labels

- Nested arrays vs. nested hashes

```
team[5][3][0]
```

```
team["MK DiBoux"]["points per game"]["1"]
```

Hashes Provide Informative Labels

- Nested arrays vs. nested hashes

`team[3][2]`

`team["Harvey Kay"]["position"]`