Introduction to *Scripting*

ICS 215

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What is a scripting language?

A scripting language is a programming language.

# Describing a Scripting Language

By Features

1. No explicit compile step

2. No type declarations for variables

3. Kept in source form

By Purpose and Use

1. Gluing existing components together

2. Not intended for writing complex systems
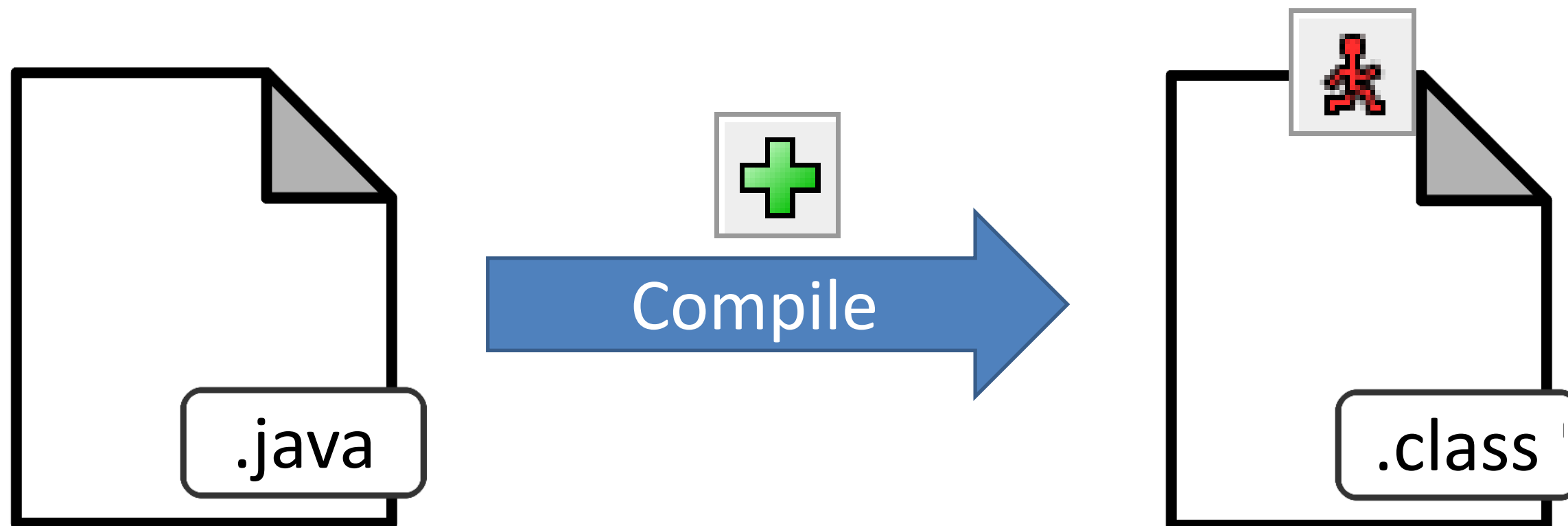
3. Rapid application development

Interpreted Languages

- Execute source code without being compiled into machine code
 - Accomplished by an interpreter
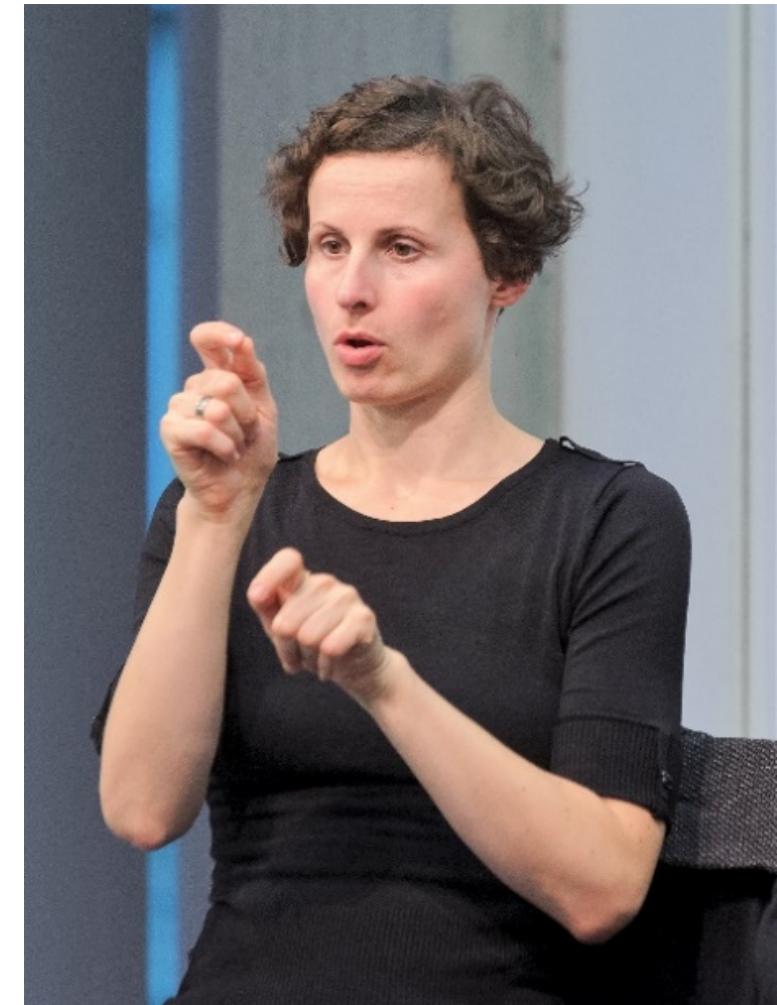
Compiling

- The process of turning source code into machine code
  - Source code is understood by humans
  - Machine code is understood by hardware

.java   **Compile**   .class

Interpreted Languages

- Execute source code without being compiled into machine code
  - Accomplished by an interpreter
- Usually associated with scripting languages
  - There's more to the story
  - "No explicit compile step"
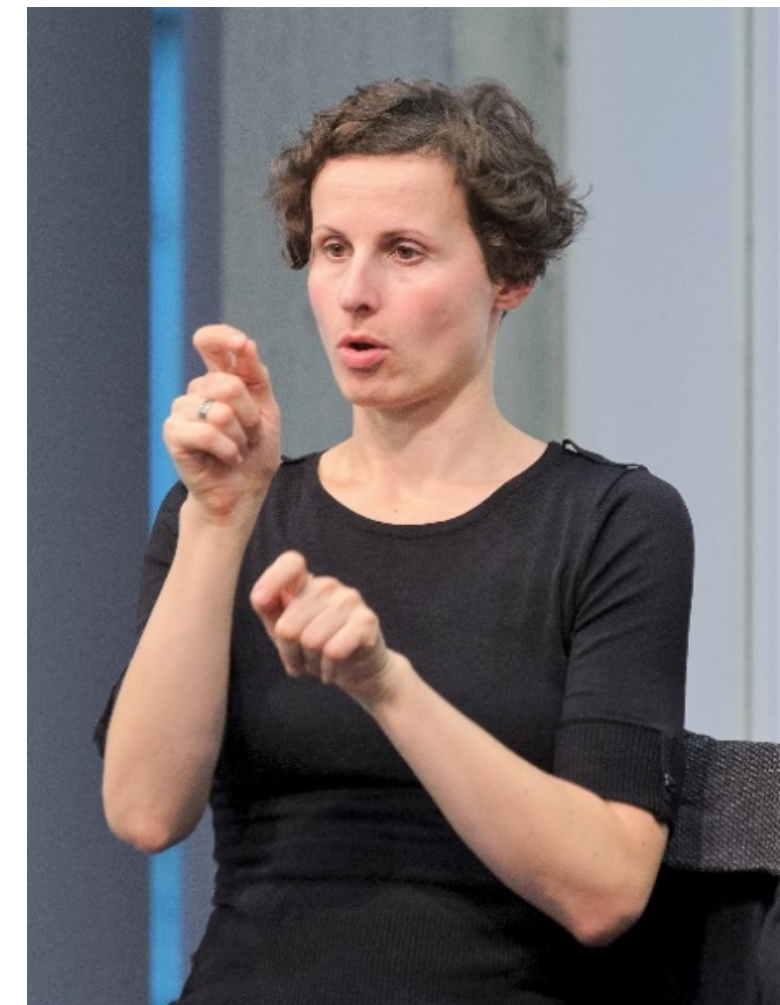
Scripts are "Interpreted"

- No explicit compile step by the user
- Common scripting languages are not purely interpreted
  - Just-in-time (JIT) compilation - compile at run time
  - Compiling and interpreting happen

Benefits of "Interpreted"

- Generate and execute code on the fly
- Rapid turnaround
- Increases productivity

Feature #2

No type declarations for variables

Java Programming Language

- Java is strongly typed

- Need to declare how each piece of data will be used

```
String output = "";
```

- Each variable must be used in ways that are appropriate for that type

Is this allowed in Java?

```
String output = "Hello World!" / 5;
```

Is this allowed in Java?

```
String output = "Hello World!" / 5;
```

No!

Advantages of Strong Typing

- Large programs more manageable
  - Clarifies how things are used and treated
- Catch errors before runtime
  - Divide a string?
  - Invalid method calls, variable assignments
- Improves performance
  - Mainly via the compiler

Type System in Scripting Languages

- <u>Typically</u> typeless/weakly typed

  - Makes it easy to glue components together

- No type declaration for variables

  - Declare a name for a variable and use it!

- Meaning of data is determined by the way it is used

Typing Example Comparison

- In Java

```
String output = new String("Hi");
output = "Bye";
```

- In Python

```
output = "Hello World!";
output = 5 + 3;
```

Feature #3

Kept in source form

Kept in Source Form

- Scripts are stored and maintained in source form
    - Source form is plain-text
- View JavaScript by viewing the source of a webpage
- Java applications are distributed via .jar or .exe files
    - Compiled Java source code

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Traditionally...

- To automate a task that is typically mundane and repetitive
  - Setting up a shared printer in a network environment
  - Reading text files and extracting specific information
- Gluing components
  - Take the output of one system, use it as input in another system
  - Interfacing between a database and a web server

How are scripts being used?

- Shell scripting
- Web scripting
- General purpose

What are scripts used for?

- Shell scripting
  - A file that contains commands that would normally be typed on a command-line
    - May contain programming logic
  - Bash (UNIX) and Batch (Windows)

What are scripts used for?

- Web scripting
  - Server-side scripting: Perl, PHP, Python, and JavaScript
    - Create personalized webpages for each user
    - Connect to a database
  - Client-side scripting: JavaScript
    - Adding behaviors to webpages

What are scripts used for?

- General purpose
  - Perl, JavaScript, PHP, Python
  - Create standalone programs for users
  - Can be used in multiple domains

Describing a Scripting Language

2. Not intended for writing complex systems

- Comes back to typing rules
- Managing data is difficult because types are not explicitly declared

3. Rapid application development

- Quickly create a working prototype
- But eventually switch to a compiled language

Many Languages!

- How to know which to use?
  - Try out other languages
  - Experiment
  - ICS 215!
- TIOBE Index
  - A ranking of which languages are relevant
  - https://www.tiobe.com/tiobe-index/