

# Application Design Using Java

Lecture 01

# Course Resources I

- Course Web Site

<https://www.cs.rpi.edu/academics/courses/spring21/csci4960>

- WebEx Teams

The image shows a screenshot of a web browser displaying the course website for 'Application Design Using Java Spring 2021'. The browser address bar shows the URL: [cs.rpi.edu/academics/courses/spring21/csci4960/index.html](https://www.cs.rpi.edu/academics/courses/spring21/csci4960/index.html). The website has a blue header with the course title and a search bar. Below the header, there is a 'Welcome to Application Design Using Java - Spring 2021' section with a list of links: 'Weekly lecture schedule', 'Weekly office hours schedule', 'Schedule, notes, reading', 'Practice Problems', and 'Homework assignments'. Overlaid on the bottom left of the website is a WebEx Teams interface. The WebEx Teams window shows a sidebar with icons for chat, video, and calendar. The main area displays the 'Teams/CSCI 4960 Spring 2021' page, which has tabs for 'Spaces' and 'Members'. The 'Members' tab is active, showing a list of team members: 'Add team members', 'Kuzmin, Konstantin' (Moderator), and 'Wang, Maoyu' (Moderator).

# Course Resources II

- Mediasite

[https://mediasite.mms.rpi.edu/Mediasite5/Channel/app\\_java\\_s21](https://mediasite.mms.rpi.edu/Mediasite5/Channel/app_java_s21)



- Submittity

<https://submittity.cs.rpi.edu/courses/s21/csci4960>



# Syllabus


- <https://www.cs.rpi.edu/academics/courses/spring21/csci4960/syllabus.htm>

## CSCI 4960 section 01 Syllabus Rensselaer

TOPICS IN CSCI

### Course Information

CSCI 4960 01 : TOPICS IN CSCI ( 4 Credits )

 2021\_Spring Term  Computer Science  School of Science

 2021\_Spring Term [202101]  
**Term Start Date:** Wednesday, 13-Jan-2021 **Term End Date:** Friday, 18-Jun-2021

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#### Location and Schedule:

**CRN:** CSCI4960

RPI Institute LMS Link

<https://lms.rpi.edu/>

Other LMS Information

<https://submitty.cs.rpi.edu/courses/s21/csci4960>

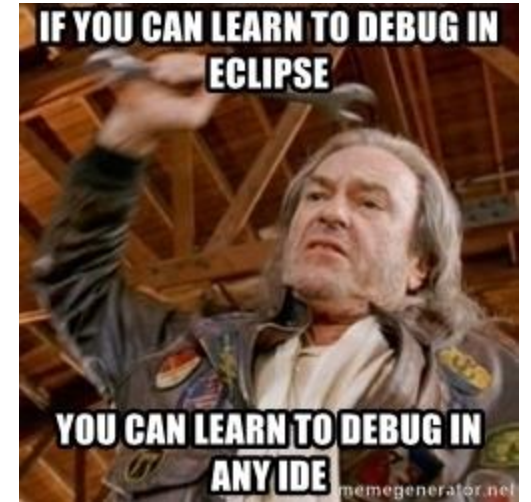
<https://www.cs.rpi.edu/academics/courses/spring21/csci4960>

Prerequisites or Other Requirements

CSCI 2300 Intro to Algorithms and CSCI 2600 Principles of Software.

# Tools and Required Software

- Initially
  - Java SE Development Kit (JDK)
  - Your favorite text editor
- Later
  - Apache Tomcat
  - MySQL
  - Neo4j
- Optional
  - XML editor
  - HTTP requests plugin for your favorite Web browser
  - IDE? Not recommended. Only if you *really* want it.



# Java at a Glance

- Object oriented
- Uses Mixed Model for variables
- Has no relationship to JavaScript
- “Write once, run anywhere (WORA)”
- Runs on many devices
- Java buzzwords
  - Simple
  - Object-Oriented
  - Distributed
  - Robust
  - Secure
  - Architecture-Neutral
  - Portable
  - Interpreted
  - High-Performance
  - Multithreaded
  - Dynamic



## #10years challenge

**2009**



**2019**



# Java History

- Started as a project called "Oak" by James Gosling in June 1991
- Sun Microsystems maintained and developed Java for almost 20 years
  - Java 1.0 (1996)
  - ...
  - Java 1.2 (1998), then renamed Java 2 Version 1.2
  - ...
  - Java 1.5 (2004), then renamed Java 2 Version 5.0
  - Java 6.0 (2006)
- Oracle acquired Sun Microsystems in 2010
  - Java 7.0 (2011)
  - ...
  - Java 15.0 (September 2020)



Dr. Java 



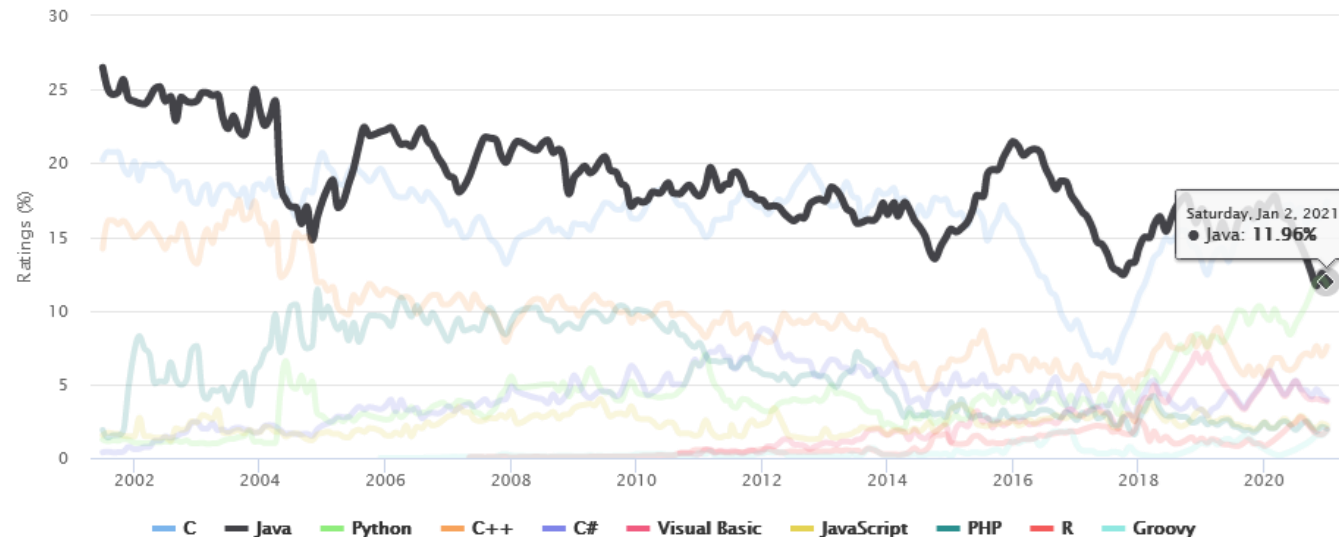
# Java and Other Programming Languages

- TIOBE Index

- An indicator of the popularity of programming languages
- Based on the number of skilled engineers world-wide, courses and third party vendors

TIOBE Programming Community Index

Source: [www.tiobe.com](http://www.tiobe.com)

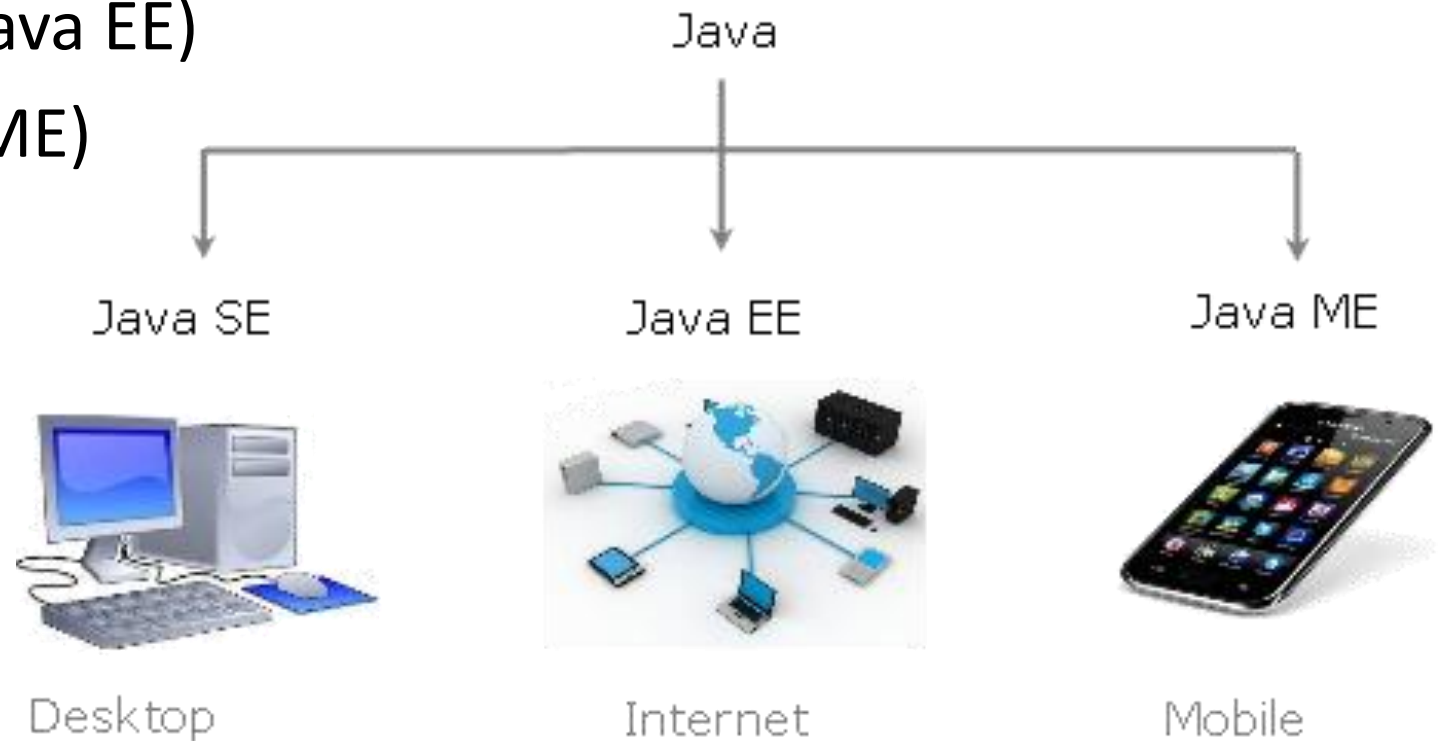


Jan 2021	Jan 2020	Change	Programming Language	Ratings	Change
1	2	▲	C	17.38%	+1.61%
2	1	▼	Java	11.96%	-4.93%
3	3		Python	11.72%	+2.01%
4	4		C++	7.56%	+1.99%
5	5		C#	3.95%	-1.40%
6	6		Visual Basic	3.84%	-1.44%
7	7		JavaScript	2.20%	-0.25%
8	8		PHP	1.99%	-0.41%
9	18	▲▲	R	1.90%	+1.10%
10	23	▲▲	Groovy	1.84%	+1.23%



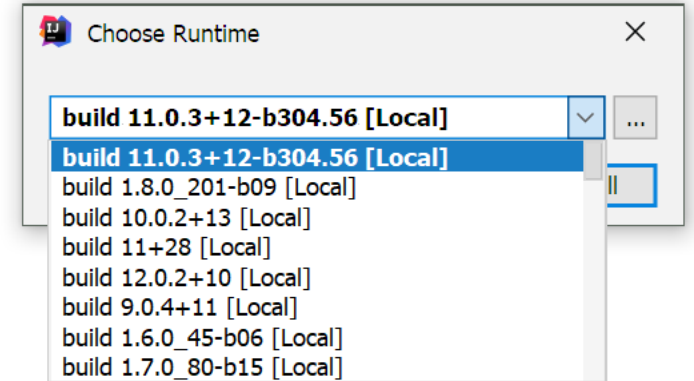
# Java Editions

- Java Standard Edition (Java SE)
- Java Enterprise Edition (Java EE)
- Java Micro Edition (Java ME)



# Java Version Numbering

- Same format since 1.3.1
- \$FEATURE.\$INTERIM.\$UPDATE.\$PATCH
  - \$FEATURE – contains new functionality, increments every six months
  - \$INTERIM – always zero, reserved for future needs
  - \$UPDATE – customer focused bug fixes, time-based like \$FEATURE, updates monthly after the latest feature release
    - 2 digits following the underbar indicate the update number
    - The higher the number, the more recent the update
  - \$PATCH – maintenance releases, engineering focused bug fixes
  - Dash "-" separator is used to indicate a non-GA release



# Java Versions

- Evolution of Java

Version	New Features
1.0	The language itself
1.2	The <code>strictfp</code> modifier
5.0	Generic classes, “for each” loop, varargs, autoboxing, metadata, enumerations, static import
7	Switch with strings, diamond operator, binary literals, exception handling enhancements
8	Lambda expressions, interfaces with default methods, stream and date/time libraries
9	Modules, miscellaneous language and library enhancements
11	Dynamic class-file constants, local-variable syntax for Lambda parameters

# Java Release and Support Policy

- A Long-Term-Support (LTS) release every three years
- A non-LTS release
  - A cumulative set of implementation enhancements of the most recent LTS release
  - Supersedes any previous non-LTS release
- Oracle Java SE Support Roadmap

Release	Generally Available Date	Premier Support Until
7	July 2011	July 2019
8	March 2014	March 2022
...		
11 (LTS)	September 2018	September 2023
12 (non-LTS)	March 2019	September 2019
...		
15 (non-LTS)	September 2020	March 2021

# Oracle Java Certification



- Novice-level certification focused on students in secondary schools, colleges, and universities, as well as faculty members who teach foundational Java and computer science classes



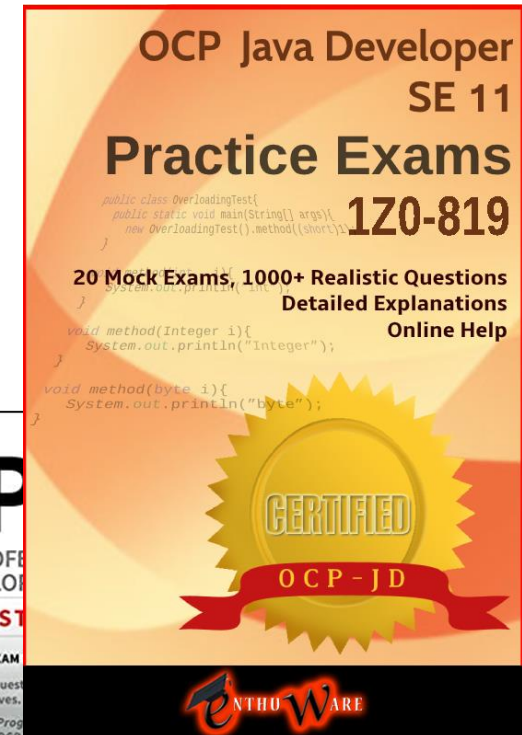
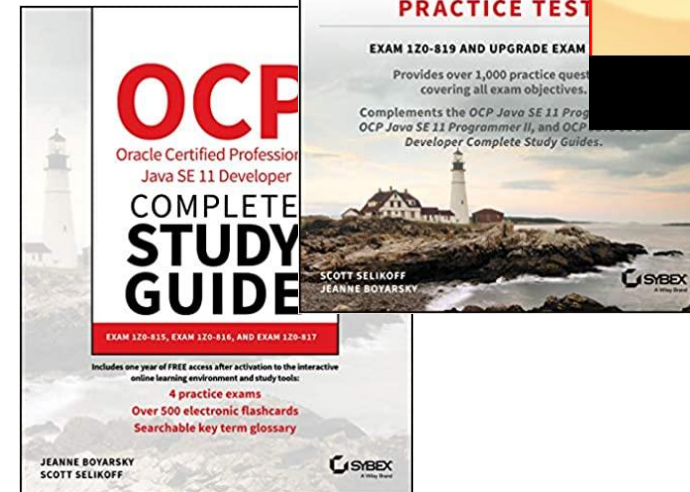
- First step toward achieving an Oracle Certified Professional certification



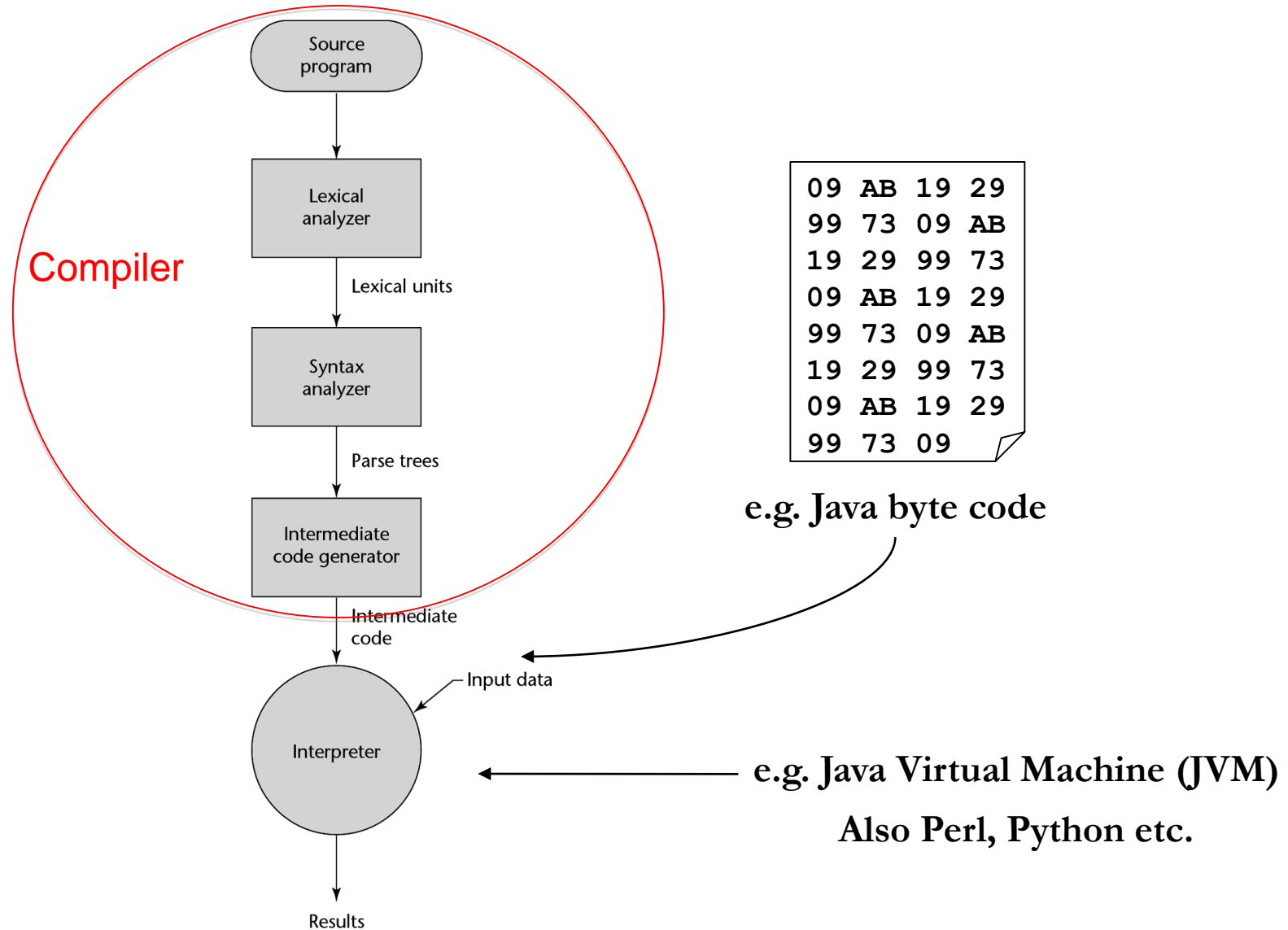
- The Oracle Certified Professional has a command of a specific area of Oracle technology and demonstrates a high level of knowledge and skills

# Oracle Certified Professional

- Java SE 11 Developer Exam Number: 1Z0-819
  - 90 minutes
  - 50 questions
  - Passing score: 68%
  - Topics
    - Working with Java data types
    - Controlling Program Flow
    - Java Object-Oriented Approach
    - Exception Handling
    - Working with Arrays and Collections
    - Working with Streams and Lambda expressions
    - Java Platform Module System
    - Concurrency
    - Java I/O API
    - Secure Coding in Java SE Application
    - Database Applications with JDBC
    - Localization
    - Annotations
- Lots of practice tests and prep materials



# Java Execution Model



# Java bytecode

- Bank.java      `accounts[to] += amount;`
- `javac Bank.java`
- `javap -c -v Bank`
  - `aload_0`
  - `getfield #2; //Field`
  - `accounts:[D`
  - `iload_2`
  - `dup2`
  - `daload`
  - `dload_3`
  - `dadd`
  - `dastore`



# JDK vs. JRE

- Installing
- Configuring environment variables

# JDK tools

- Installed under bin/ directory of JDK

Name	Description
javac	The compiler for the Java programming language.
java	The launcher for Java applications.
javaw	Identical to java, except that with javaw there is no associated console window. Use javaw when you do not want a command prompt window to appear.
apt	Annotation processing tool.
appletviewer	Run and debug applets without a web browser.
jdb	The Java Debugger.
javadoc	API documentation generator.
jar	Create and manage Java Archive (JAR) files.
javah	C header and stub generator. Used to write native methods.
javap	Class file disassembler.
extcheck	Utility to detect Jar conflicts.
native2ascii	Convert text to Unicode Latin-1.

# Compiling and Running Java Programs

- javac
- java/javaw

# //TODO before next lecture:

- Install software and tools
- Configure your environment to compile and run Java code