Coding

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Professional Development
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Agenda

Part 1:

- Why code?
- What is code?
- Example

Part 2:

- Solutions
- Building blocks
- Example

Coding

Part 1

Who should learn to code?

EVERYONE

Part 1

Knowing how to code….

- **Demystifies** everyday technology and makes the modern world more **understandable**
- Provides a tool for **makers**, **problem solvers**, and anyone with a **“big idea”**
- Gives you access to **advanced features** of **tools you already use**
- Gives you **career flexibility**
- Reinforces **logical thinking** and **keeps you sharp**
- Is **empowering** and builds **confidence**

Coding is awesome because….

- There are **logical outcomes**
- You get to **solve puzzles**
- You can create **something** from **nothing**
- You can work **individually** or as part of a **team**
- You can have ***TOTAL CONTROL***
- There can be (nearly) **instant gratification**
- Your work can be used/experienced **by other people**
- You have can distribute your work **world-wide**
- **IT'S SUPER FUN**

What is coding?

- Getting a **computer/device** to **do what you want** it to do
- Writing instructions about **what to do** and **when**
- Writing instructions about **how to get from start to finish**
- Transforming **inputs into outputs**
  - *Inputs*: on/off switch, time, data, sensors, user activity
  - *Outputs*: on/off switch, data, graphics, streams, almost anything!
- **Translating human instructions into instructions a computer/device can understand**
  - Best/Worst Kid Ever: Does exactly what you say

Code is written as text, usually in a plain ol' text file

Examples of coding

- Emojis

  :) -> 😀
- Skype bold command

  Hello -> **Hello**
- Excel formulas

  =SUM(A2:A8) -> 37
- HTML markup

  Hello -> *Hello*
- database queries

  SELECT F_NAME || L_NAME FROM PEOPLE -> Jerry Seinfeld

- CloudFormation AWS specs

```
MyDataBucket:
 Type: AWS::S3::Bucket
 Properties:
   AccessControl: AuthenticatedRead
   BucketName: my-data-bucket
```

- NodeJS AWS Lambda microservice

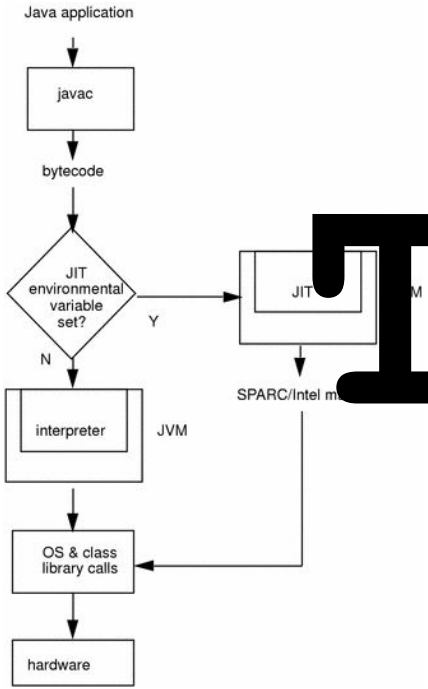
```
module.exports.list = (evt, ctx, cc) => {
  console.log('list',evt);
  let output = {status: 200, data: [],
    meta: {}, message:null};
    return esClient.search({
    …
    });
};
```

Context is everything

Where will your code runs will determine...

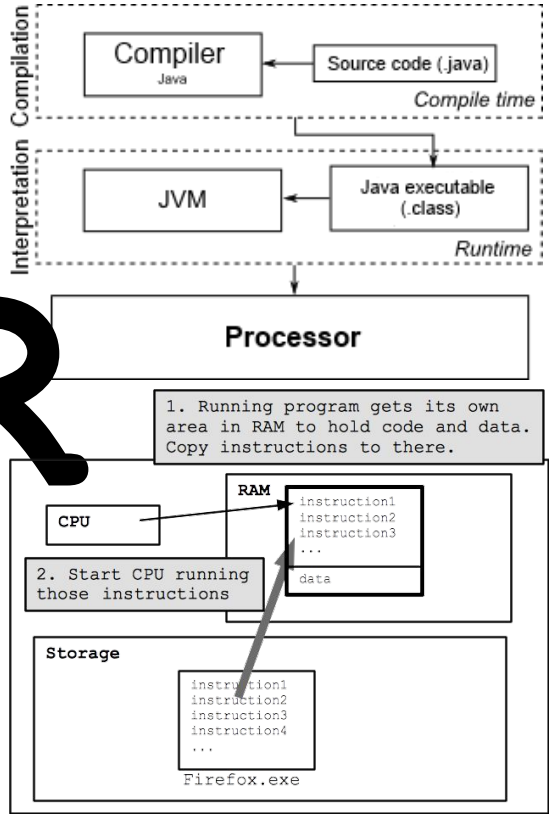
- Languages/instruction syntax
- Possible commands/capabilities
- Execution rules
- Available helpers (libraries)
- Execution performance
- Access to computer resources
- Installation/distribution

How does my code run?



In Java, programs are not compiled into executable files; they are compiled into bytecode (as discussed earlier), which the JVM (Java Virtual Machine) then executes at runtime. Java source code is compiled into bytecode when we use the javac compiler. The bytecode gets saved on the disk with the file extension .class. When the program has to be run, the code is loaded by the just-in-time (JIT) compiler. The result is machine code which is then cached to the memory and is executed. Java code needs to be compiled twice in order to be executed. Java programs need to be converted to machine code when they are executed. This is run, it needs to be converted to machine code. The Java classes/bytecode are compiled to machine code and loaded into memory by the JVM when needed the first time. This is different from other languages like C/C++ where programs are to be compiled to machine code and linked to create an executable file before it can be executed.

TLDNR



Example

Stand-alone Guestbook

Part 1

Coding

Part 2

Solutions

- Decompose problems into aspects/concerns
  - What is the “real” functionality we need?
  - What is the “implied” functionality we need?
  - What models/analogs/solutions already exist?
  - What are the current/future standards/best-practices we need to follow?
- Map aspects/concerns to building blocks
  - What components do what we need?
  - Can we think about functionality differently to create “better” mappings?
  - What components must be built and what can be bought and configured?
- Compose selected building blocks into a solution
  - Will we have everything we need?
  - Will all the components work together?
  - What will the total cost of ownership be?
  - Can the solution evolve over time?
- Break-down the work that needs to be done
  - What are the tasks?
  - Who will do the work?
  - How long will it take?
  - How much will it cost?

Building Blocks

- Data Stores
  - Relational databases (Oracle, MS-SQL)
  - Object/No-SQL databases (Mongo, DynamoDB)
  - Search indexes (ElasticSearch, Solr)
  - Data warehouses (Snowflake, Big Query, Panoply)
  - Files (XML, JSON, MS Excel, CSV, etc)
- Asynchronous Activities
  - Work queues (RabbitMQ, Amazon SQS)
  - Broadcast topics (RabbitMQ, Amazon SNS)
  - Timers (cron, Amazon CloudWatch events)
- Web Servers
  - Traditional (Apache HTTP, Nginx, Tomcat, IIS)
  - CDN (CloudFlare, CloudFront)
  - Embedded (Oracle, ElasticSearch)
- Business Logic Executors
  - Application Servers (WebSphere, WebLogic)
  - Microservices (AWS Lambda, Google Functions)
  - Embedded (Web browsers, Web servers, Datastores, Messaging systems)
  - Analysis/AI (Tableau, Power BI, Google AI, TensorFlow, MS Azure)
- User Interfaces
  - Desktop/mobile web browser (Chrome, Safari)
  - Desktop/mobile app (MS Excel, Instagram)
  - Other devices (Apple Watch)
- Out-of-app Communication
  - External APIs
  - Email, SMS
- Other Equipment
  - Sensors (Temperature, acceleration, location, biometrics)
  - Switches (Motors, power outlets, locks)

Getting work done (bleh)

Development Process

- Analysis
- Planning
- Design
- Construction
- Testing
- Deployment

Additional Activities

- Source code control
- Quality control
- Status monitoring
- Time tracking
- Invoicing
- Customer feedback

Coding Playgrounds

- Browser “View Source” and “Inspect”
- IFTTT
- playcode.io
- jsfiddle.net
- emojicode.org

Example

Web Guestbook

Part 2