Computer Languages

The process of creating software

Compiler
Interpreter
Assembler

Object code
Executable code
Machine language
Binary code

This is the final result

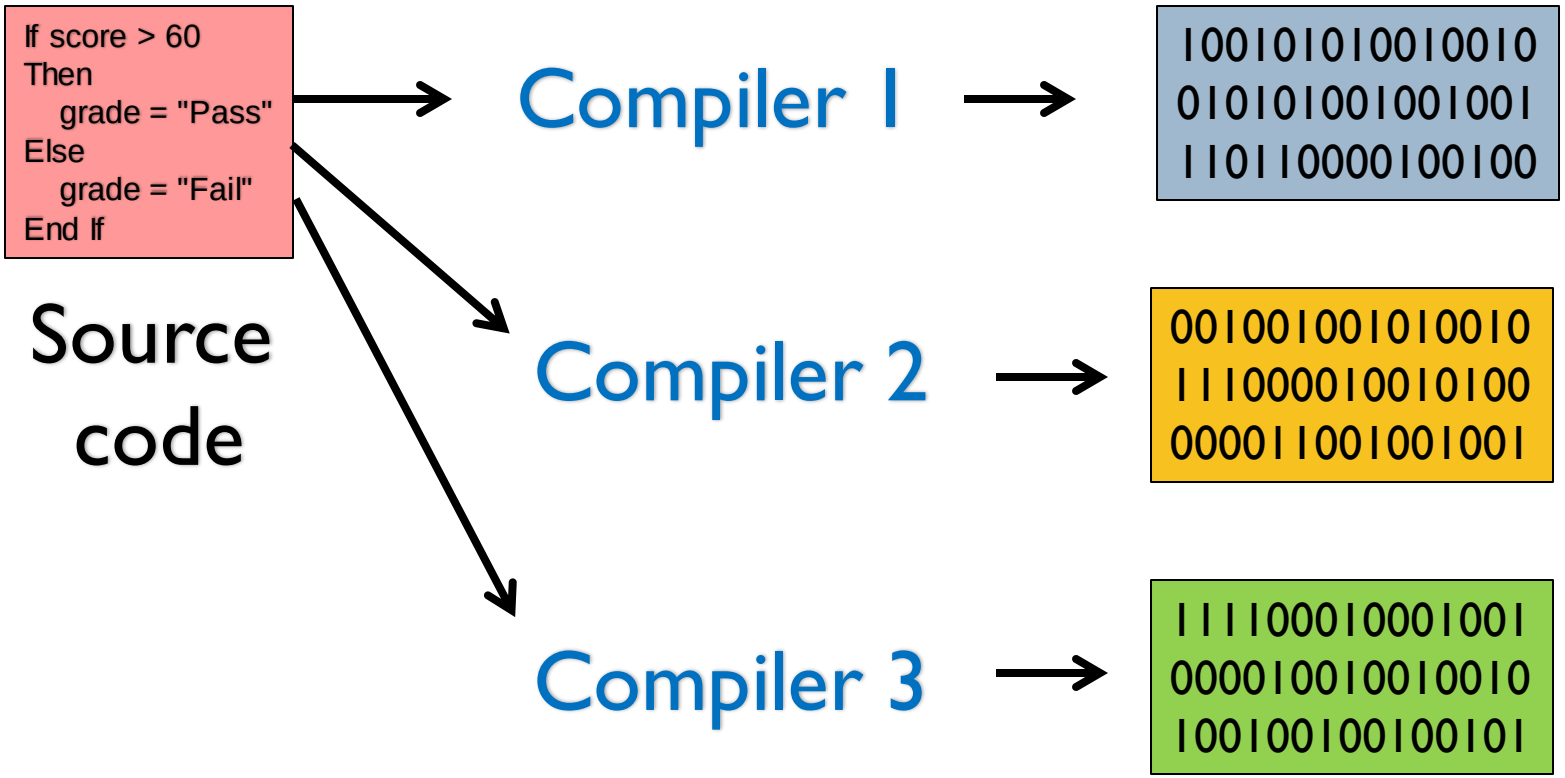
```
1001101010010
1001001000101
0101000100100
```

Object code
Executable code
Machine language
Binary code

Early computer languages

Generation	Language	Translation	Examples	Notes
First	Machine	None needed	10101010101 00110001010 10100010001	Every type of CPU has it's own machine language Machine dependent
Second	Assembly	Assembler	ADD SUB MPY DIV HLT	Every type of CPU has it's own assembly language Machine dependent

Machine independent code



Third generation languages

Language	Date	Translation	Purpose	Comments
FORTRAN	1957	Compiler	Math, science, engineering, statistics	Includes formulas, functions, pi, e, imaginary numbers
COBOL	1960	Compiler	Business, accounting, payroll, inventory management, census	English-like commands Machine independent
BASIC	1964	Interpreter	Education	Easy to read and understand code Easy to test code

Other languages

Language	Purpose
B, C	System software
RPG	Report generation (business)
SPSS	Statistics
ALGOL	Business (European)
GPSS	Simulation
ADA	Embedded systems (Air Force)
LISP	Artificial intelligence
PL/I	General purpose (IBM)
PASCAL	Education
APL	Applied mathematics
F	Scientific

Fourth generation and beyond

Type	Examples
Database management	SQL
Visual languages (GUI)	Visual Basic Visual Age Hopscotch
Excel macro language	Visual Basic for Applications (VBA)
Numbers macro language	Apple Script
Object-oriented languages	Java C++ C# F# Smalltalk
Rapid Application Development (RAD) Computer-Assisted Software Engineering (CASE)	Delphi Power Builder Automatic Program Generator

Internet languages

Client languages	HTML5 JavaScript Cascading Style Sheets (CSS) eXtensible Markup Language (XML)

Internet languages

Server languages	C++
	Java
	Python
	Ruby
	Perl
	PHP

Mobile App Languages (iOS and Android)

- Objective C
- Swift
- C++
- C#
- Java
- Visual Basic
- HTML5
- JavaScript

Data Science and Big Data programming

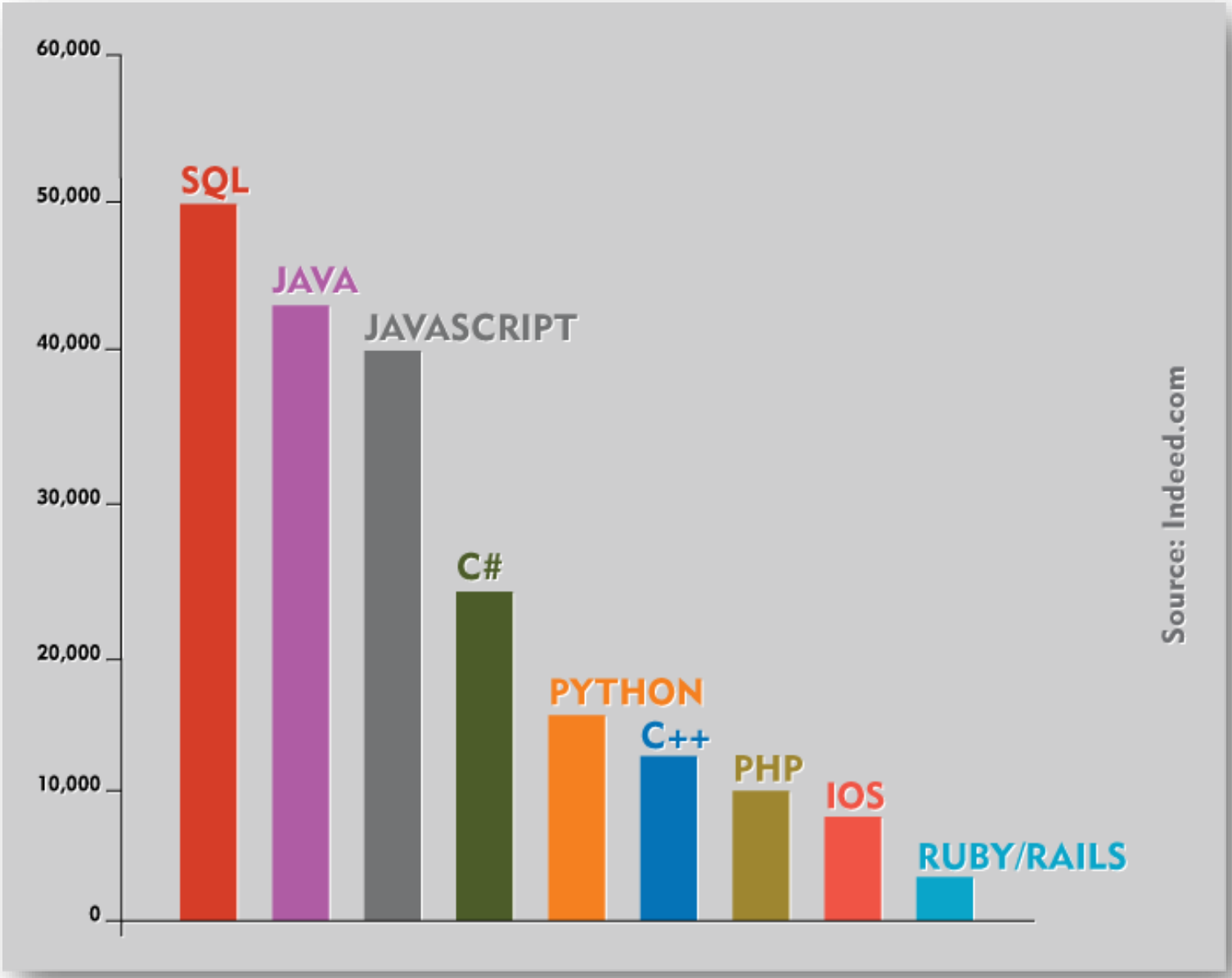
- Statistical Analysis System (SAS)
- R
- S
- Python
- Scala
- MATLAB
- SQL

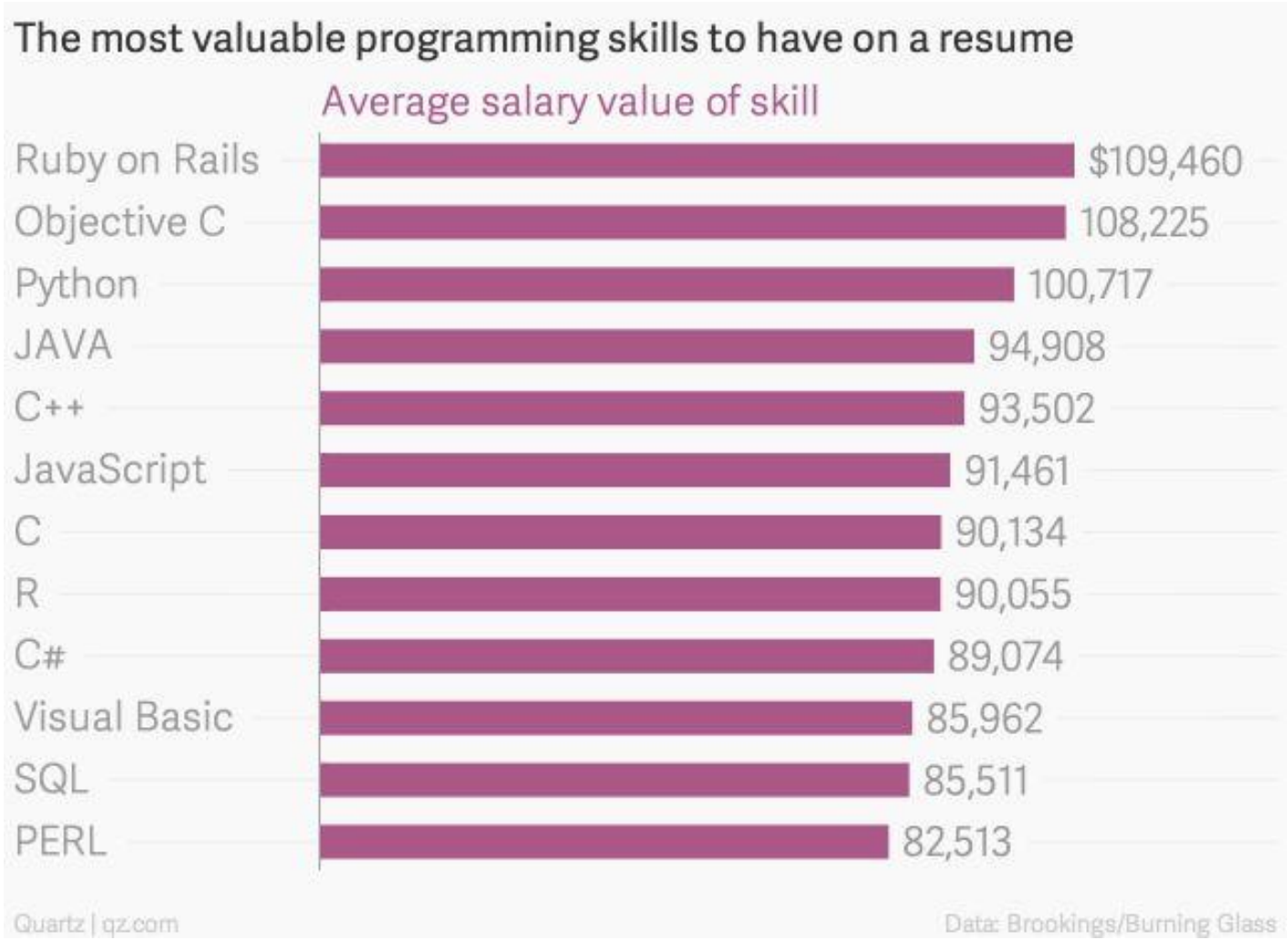
Internet of Things (IoT)

- C++
- Java
- D
- Python
- Swift
- PHP

Who invents computer languages?

- Hardware companies
- Software companies
- Universities
- Governments/standards organizations
- Individuals


60,000
50,000
40,000
30,000
20,000
10,000
0
SQL
JAVA
JAVASCRIPT
C#
PYTHON
C++
PHP
IOS
RUBY/RAILS
Source: Indeed.com


The most valuable programming skills to have on a resume
Average salary value of skill
Ruby on Rails
$109,460
Objective C
108,225
Python
100,717
JAVA
94,908
C++
93,502
JavaScript
91,461
C
90,134
R
90,055
C#
89,074
Visual Basic
85,962
SQL
85,511
PERL
82,513
Quartz | qz.com
Data: Brookings/Burning Glass

The future…

- What types of programmable devices will we have?
- Natural language programming
- Self-programming computers