

Requirement 2. History.

Discuss with your counselor the history of programming and the evolution of programming languages, including at least three milestones related to the advancement or development of programming over time.

Binary and Machine Code

Computers use 0 and 1 (binary) to represent off and on. A computer uses these 1's and 0's to provide instructions on what to do and how data is represented. The first programmers needed to enter these 1's and 0's by hand using buttons and switches. This was difficult to remember and it was very tedious to enter the binary codes.

BSA in Binary

B = 01000010

S = 01010011

A = 01000001

Assembly

The first milestone was the introduction of assembly language. Assembly language provides a text form of the binary operations and data. Assembly language is more readable and is translated to binary code. However, each kind of computer has its own assembly language.

An Example of Assembly Language

```
L      R1,FAHREN
S      R0,=F'32'
M      R0,=F'5'
D      R0,=F'9'
ST     R1,CELSIUS
```

FORTRAN and COBOL

As computers became more widespread, programs needed to be copied to different types of computers. The next milestone was the development of high languages such as FORTRAN and COBOL. These languages were machine-independent so they could be copied to computers of different types without rewriting the program. The computer would then translate the program into binary code and run. High level languages focus on different types of problem solving such as scientific or business.

An Example of FORTRAN

```
REAL FAHR, CELSIUS
READ *, FAHR
CELSIUS = (FAHR - 32.0) * 5.0 / 9.0
PRINT *, FAHR, ' F is ', CELSIUS, ' C.'
```

C++ and Java

As programs grew more complex with diverse uses, organizing the data as well as the parts of the programs became important. The next milestone in programming was the development of object-oriented programming

which used classes and data structures to help programmers build larger programs with reusable parts. These languages were also more general-purpose.

An example of Java

```
if (scanFahren.hasNextDouble( )) {
    Fahrenheit = scanFahren.nextDouble( );
    Celsius = (Fahrenheit-32)*5/9;
} else (
    System.out.println("Bad data.");
    System.exit(-1);
}
System.out.println("Temp is " + Celsius + "C");
```

Objects and Libraries

While object-oriented languages existed in the 1960s, their use flourished with the next milestone of programming when objects and libraries of useful algorithms and data structures became available and trusted. These languages also included support for user interfaces and built in memory management.. Objective-C and C# are two examples these languages.

An example of C#

```
DegText = double.Parse(TextBox1.Text);
CelText = (5.0/9.0) * (DegText-32.0);
if (DegText > 100) {
    Text6.Text = "It's Hot! Better Hydrate!";
    Text6.Visibility =
        System.Windows.Visibility.Visible;
}
```

Special Purpose

Often, having a tool designed for a specific job is handy. Many languages mentioned here are general-purpose, but another milestone of programming are special-purpose languages. Programming languages such as PHP supports web programming while Ladder Logic supports programmable logic controllers in industrial automation.

An Example of PHP

```
$celsius = (float)(($fahrenheit-32)/1.8);
$returnText = "You converted"
    .round($fahrenheit)."F to "
    .round($celsius)." C";
If ($fahrenheit < 32)
    $returnText .=":Pack Long Underwear";
Elseif ($fahrenheit > 100)
    $returnText .= "Remember to Hydrate";
return $returnText;
```

5 minute video of programming language history

<https://youtu.be/K5yv7dY17EA?si=yYdqNCZwa0w0SzJs>

Text descriptions of historical progression of programming languages

<https://www.computer.org/publications/tech-news/insider-membership-news/timeline-of-programming-languages>

Computer History Museum timeline with pictures

<https://www.computerhistory.org/timeline/software-languages/>