20CYS312 - Principles of Programming Languages
Exploring Programming Paradigms

Assignment-01

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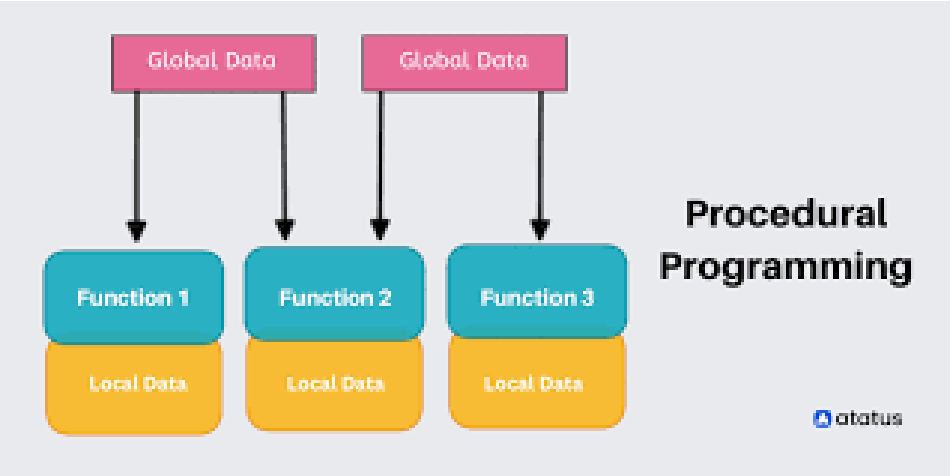
Outline

Procedural Programming Paradigm

What is Procedural Programming

- A procedural programming language is one that uses sets of functions and commands to complete actions. Many programming languages use the procedural programming paradigm, including BASIC, C and Forth.

- **Procedures** are the set of instructions that are followed to complete the given task. These take a top down approach as the instructions are executed in a sequence or an order.
- In procedural programming, we divide our instructions into smaller blocks of well-defined code. These code blocks are known as functions, where each function performs a specific task.



Forth

- **Forth** is a procedural language and also uses stack based programming. The computation is primarily performed by manipulating a data stack. Operators and operands are pushed onto and popped off of the stack, and procedures are defined to operate on the stack data.
- **Forth** programs are organized into procedures, which are called "words" in Forth terminology. **Words** encapsulate a sequence of operations, and the control flow is directed by invoking these Words.
- Forth encourages a modular programming style, allowing programmers to define reusable words (functions) that can be composed to build more complex programs.
- Forth is used in :
  1. Embedded Systems
  2. Operating Systems
  3. Space exploration missions

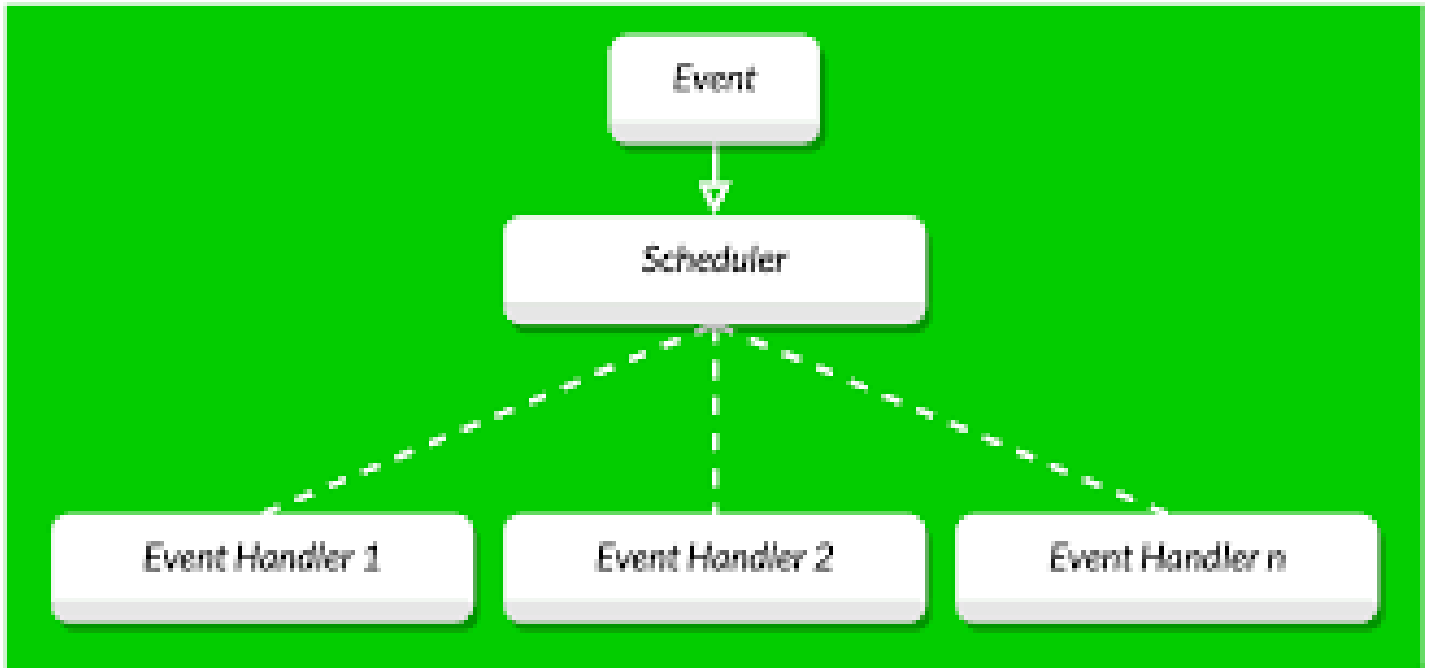
Event-Driven Programming Paradigm

What is Event-Driven Programming

Event Driven Programming is a programming approach that enables software to respond to events originating from external sources, such as user input or system changes.

- Key Features of Event Driven Programming are:
  1. **Responsive Applications**: Event Driven Programming allows applications to effectively respond to user input, resulting in a more dynamic and user-friendly experience.
  2. **Concurrency**: Asynchronous event handling enables applications to execute multiple tasks concurrently.
  3. **Modularity**: The separation of concerns in event-driven applications, through distinct event handlers and event management, promotes modularity and maintainability.
  4. **Real-Time Processing**: In the context of real-time applications, Event Driven Programming enables the processing of events as they occur, ensuring the continuous distribution of up-to-date information and consistent system responsiveness.

Events Scheduling



Angular JS

- AngularJS is a free and open-source JavaScript-based web framework that is maintained mainly by Google and a community of individuals and corporations
- AngularJS is a JavaScript framework. It can be added to an HTML page with a <script> tag.
- An Events in AngularJS can be used to perform particular tasks, based on the action taken. Both Angular Event the HTML Event will be executed will not overwrite with an HTML Event.

Comparison: Code and functionalities

Angular JS Example code :

```
<div ng-app="App1"
     ng-controller="Ctrl1">
    <h1 ng-mousemove="count = count + 1">
        GeeksforGeeks
    </h1>
    <h2>Total Count:</h2>
    <h2>{{ count }}</h2>
</div>
<script>
    var app = angular.module('App1', []);
    app.controller('Ctrl1', function($scope) {
        $scope.count = 0;
    });
</script>
```

- In the above code, the imported angular module is used to create an event where, if the user hovers over the GeeksforGeeks text, the count increases.
- The event here is that the mouse hovering over the <h1> tag with GeeksforGeeks as text.

Comparison: Code and functionalities

Forth Example code :

```
oxalate@MANO ~> gforth
Gforth 0.7.3, Copyright (C) 1995-2008 Free Software Foundation, Inc.
Gforth comes with ABSOLUTELY NO WARRANTY; for details type `license'
Type `bye' to exit
4  ok
5  ok
6  ok
7  ok
8  ok
123  ok
.s <6> 4 5 6 7 8 123  ok
+  ok
.s <5> 4 5 6 7 131  ok
. 131  ok
.s <4> 4 5 6 7  ok
. 7  ok
: LOOPS ( n -- )   >IN @  SWAP 0 DO  DUP >IN !  INTERPRET  LOOP DROP ;  ok
7 LOOPS CHAR $ EMIT SPACE $ $ $ $ $ $ $  ok
```

- Forth uses stack based approach. This means that the elements entered line by line are stored in a stack.
- The operations are also stored in the stack and executed simultaneously. From this we can see that Forth is a procedural programming language.
- LOOPS is a word(or function as popularly used in general programming languages), that is written now by the user to print specific characters, specific numbers of ti

Comparison: Code and functionalities

Procedural

- Paradigm that has pre-defined instructions and follows a top-down approach(or is executed in a pre-defined order).
- Uses **Procedures** to complete the programming tasks.
- Programs typically execute in a linear fashion, with the execution flowing through a sequence of steps in a predictable manner.
- Example : FORTH, COBOL, BASIC, C

Event-Driven

- Paradigm that follows instructions from the users and is usually used in Graphical User Interface. The application listens for an event loop and triggers the callback function.
- Follows events that trigger different functions according to how the event changes.
- The program responds to events as they occur. The flow of execution is driven by events, and the program may not follow a linear path.
- Example : AngularJS, Visual Basic, Visual C++, Java

References

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