Pseudocode - Tutorial

What is Pseudocode?

- High-level description of operating principle of a computer program/algorithm
- Expressed in a formally-styled natural language rather than in a programming language
- No standard for pseudocode syntax exists

Why is pseudocode necessary?

1. Design and express algorithm/program
2. Revision of algorithm/program
3. Implementation in a specific platform and programming language

- Pseudocode allows:
  - Clear initial design of algorithm/program
  - Programming language independent
    - Revision of program by team members who are experts in different programming languages

Basic Rules

1. One statement per line

```
READ name, hourlyRate, hoursWorked, deductionRate
grossPay = hourlyRate * hoursWorked
deduction = grossPay * deductionRate
netPay = grossPay – deduction
WRITE name, grossPay, deduction, netPay
```

2. Capitalize initial keyword (END keyword is required)

   READ, WRITE, IF, ELSE, ENDIF, WHILE, ENDWHILE, FOR, ENDFOR, CASE, ENDCASE

3. Indent to show hierarchy

```
IF grossPay >= 100
        deduction = grossPay * deductionRate
ELSE
        deduction = 0
ENDIF
```

4. Keep statements language independent (e.g., big parentheses are not required)

Basic Structures

- Selection

IF condition [THEN]
sequence 1
ELSE
sequence 2
ENDIF

- Where *condition* is a boolean
- THEN is optional

Basic Structures

- Loop – while
  - *While* is a loop (repetition) with a simple conditional test at its beginning

WHILE condition
sequence
ENDWHILE

- Where *condition* is a boolean

Basic Structures

- Loop – for
  - *For* is a loop for iterating a specific number of times, often called a "counting" loop

FOR condition
sequence
ENDFOR

- Where *condition* is a boolean

Basic Structures

- Decision

CASE expression
  condition 1: sequence 1
  condition 2: sequence 2
  …
  condition n : sequence n
OTHERS:
  default sequence
ENDCASE

  - Where *conditions* are possible values of *expression*

Examples

- Print 0-99 numbers
- C++ vs. Pseudocode

```
void func()
{
        int iter;
        for(iter=0 ; iter<=99 ; iter++)
        {
                cout << iter;
                cout << endl;
        }
}
```

```
void function func
        FOR iter from 0 to 99
                PRINT iter
                PRINT newline
        end FOR
```

Examples

- Check if number to a function is odd or even
- C++ vs. Pseudocode

```
void func(int num)
{
        if (num%2 == 0)
                cout << “Number is even”;

        else
                cout << “Number is odd”;
}
```

```
void function func (num)
        IF num divisible by 2
                PRINT “Number is even”
        ELSE
                PRINT “Number is odd”
```

Examples

- Compute area of a triangle
- C++ vs. Pseudocode

```
int main()
{
        int height, breadth, area;

        cout <<" Enter height : ";
        cin >> height;

        cout <<" Enter breadth : ";
        cin >> breadth;

        area = 0.5 * height * breadth;
        cout << " Area : " << area;

}
```

```
READ height from user.
READ breadth from user.

COMPUTE area as 0.5 times height times height.

PRINT area
```

Examples

- Selection sort of array *a*

```
FOR i from 0 to a.length - 2
  minIndex = i

  //Find minimum element in the remaining sub array and update the minIndex
  FOR j from (i + 1) to (a.length - 1)
     IF a[j] < a[minIndex]
          minIndex = j
     ENDIF
  ENDFOR

  //Swap the minimum value find with the first element of unsorted subarray
  swap(a[i], a[minIndex])

ENDFOR
```

Useful links

- Tutorial:
  - https://www.slideshare.net/DamianGordon1/pseudocode-10373156

- Examples:
  - http://users.csc.calpoly.edu/~jdalbey/SWE/pdl_std.html

- Guidelines/Tips:
  - http://www.cs.cornell.edu/Courses/cs482/2003su/handouts/pseudocode.pdf