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Assignment 6: IOAA Document

**Data Input**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remarks/Comments |
| payRate | double | Hourly pay rate of Employee |
| firstName | string | One word first name of Employee |
| lastName | string | One-word last name of Employee |
| healthPlan | bool | Employee’s selection or declination of health plan |
| hoursWorked | double | weekly working hours of Employee |

**Data Output**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remarks/Comments |
| firstName | string | One word first name of Employee |
| lastName | string | One-word last name of Employee |
| hoursWorked | double | weekly working hours of Employee |
| payRate | double | Hourly pay rate of Employee |
| grossSalary | double | the gross salary as per labor laws described in background section, refer to function getGrossSalary |
| taxWitheld | double | Computes the tax withheld of Employee, refer to function getTaxWithheld |
| netSalary | double | Computes the net salary of Employee, refer to function getNetSalary |
| HealthPlanStatus | string | Messages depending on the state of health insurance |

**Computational Aid and Other Variables**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remarks/Comments |
| availableHealthPlan | bool | Checking condition user have enough money for health insurance. |
| healthPlanStatusMessage | string | Messages depending on the state of health insurance. |

**Global Constants**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable name | C++ Data Type | Value | Remark |
| socialTax | double | 0.071 | 7.1% |
| healthPremium | int | 200 | $200 |
| healthStatusTrue | string | health insurance register success message | this is for healthPlanStatusMessage |
| healthStatusFalse | string | health insurance register failure message | this is for healthPlanstatusMessage |
| healthStatusNone | string | health insurance no select message | this is for healthPlanStatusMessage |

**Analysis**

\* Figure 1. greeting function

|  |  |
| --- | --- |
| Design of Header for function to print greeting message | |
| Question asked | Answer |
| What is the purpose of the function? | Function greeting pleasantly greets the user, explains the purpose of software/program, inputs that may be needed, and approximate time requirement from them. |
| What is the decision on the name of the function? | greeting |
| Which parameter, will be returned to the calling block by the return statement? | None |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | None |
| What are the data types? | None |
| Based on above facts, what is the header of this function? | void greeting(); |

**Function input**: No input table is required in this case.

**Function output**: No output table is required in this case.

**Analysis**: No analysis is needed.

**Algorithm**

1. Print, ”Welcome to salary calculation program.”, EOL
2. Print, “In this program we will ask for the information that would allow us to process your pay check.”, EOL
3. Print, “We will collect information about hours worked, hourly pay rate and medical options.”, EOL
4. Print, “Processing will be completed in just few minutes.”, EOL
5. End function

//// End of IOAA for the function greeting

\* Figure 2. getUserData function

|  |  |
| --- | --- |
| Design of Header for function to get user input | |
| Question asked | Answer |
| What is the purpose of the function? | Function gets data input from the user. |
| What is the decision on the name of the function? | getUserData |
| Which parameter, will be returned to the calling block by the return statement? | hoursWorked |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | payRate, firstName, lastName, healthPlan. |
| What are the data types of parameters? | double: payRate, hoursWorked  string: firstName, lastName  bool: healthPlan |
| Based on above facts, what is the header of this function? | double getUserData (double & /\*outgoing\*/ payRate, string & /\*outgoing\*/ firstName, string & /\*outgoing\*/ lastName, bool & /\*outgoting\*/ healthPlan); |

**Function input**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable Name | Data Type | Is variable returned by the function using the return statement? | Is variable passed back to the calling block, using pass-by-reference? | Does function need to declare this variable in the function body? |
| firstName | string | No | Yes | No |
| lastName | string | No | Yes | No |
| payRate | double | No | Yes | No |
| healthPlan | bool | No | Yes | No |
| hoursWorked | int | Yes | No | Yes |

**Function output**

|  |  |  |
| --- | --- | --- |
| Variable Name | Data Type | Remarks |
| hoursWorked | int | Function’s return value. |

**Analysis**: No analysis is needed.

**Algorithm**

1. Print, “Please enter you first name: ”
2. Get and store in firstName
3. Print, “Please enter your last name: “
4. Get and store in lastName
5. Print, “Please enter hours worked: “
6. declare variable hoursWorked as int
7. Get and store in hoursWorked
8. Print, “Please enter your hourly pay rate: “, EOL
9. Get and store in payRate
10. Print, “Enter 1 to purchase health plan or 0 to decline: “
11. Get and store in healthPlan
12. return hoursWorked
13. End function

//// End of IOAA for the function getUserData

\* Figure 3. getGrossSalary function

|  |  |
| --- | --- |
| Design of Header for function to compute gross salary | |
| Question asked | Answer |
| What is the purpose of the function? | Function get two arguments, hoursWorked, and payRate. Function computes the gross salary as per labor laws described in background section and returns the gross salary by return statement mechanism. |
| What is the decision on the name of the function? | getGrossSalary |
| Which parameter, will be returned to the calling block by the return statement? | grossSalary, if hoursWorked are up to 40hours or less then grossSalary is hours work multiplied by hourly pay rate, but, if hoursWorked exceeds 40 then hours above 40 must be paid by the rate of 1.5 times of regular hourly rate. |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | None |
| What are the data types of parameters? | double hoursWorked, payRate, grossSalary |
| Based on above facts, what is the header of this function? | double getGrossSalary (double hoursWorked, double payRate); |

**Function input**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable Name | Data Type | Is variable returned by the function using the return statement? | Is variable passed back to the calling block, using pass-by-reference? | Does function need to declare this variable in the function body? |
| hoursWorked | double | No | No | No |
| payRate | double | No | No | No |
| grossSalary | double | Yes | No | Yes |

**Function output**

|  |  |  |
| --- | --- | --- |
| Variable Name | Data Type | Remarks |
| grossSalary | double | Function’s return value after computing, refer to analysis |

**Analysis**

\* If hoursWorked up to 40 hours or less then grossSalary is

grossSalary = hoursWorked \* payRate

\* If hoursWorked exceeds 40 hours then grossSalary is

grossSalary = (payRate \* 40) + ((hoursWorked – 40) \* (payRate \* 1.5))

**Algorithm**

1. declare variable grossSalary as double
2. If (hoursWorked <= 40) then
   1. grossSalary = hoursWorked \* payRate
3. Else
   1. grossSalary = (payRate \* 40) + ((hoursWorked – 40) \* (payRate \* 1.5))
4. End if
5. return grossSalary
6. End function

//// End of IOAA for the function getGrossSalary

\* Figure 4. getTaxWithheld function

|  |  |
| --- | --- |
| Design of Header for function to compute tax withheld | |
| Question asked | Answer |
| What is the purpose of the function? | Function takes grossSalary parameter by value and returns the tax withheld by return statement mechanism. |
| What is the decision on the name of the function? | getTaxWithheld |
| Which parameter, will be returned to the calling block by the return statement? | taxWithheld |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | None |
| What are the data types of parameters? | double: grossSalary, taxWithheld |
| Based on above facts, what is the header of this function? | double getTaxWithheld (double grossSalary); |

**Function input**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable Name | Data Type | Is variable returned by the function using the return statement? | Is variable passed back to the calling block, using pass-by-reference? | Does function need to declare this variable in the function body? |
| grossSalary | double | No | No | No |
| taxWithheld | double | Yes | No | Yes |

**Function output**

|  |  |  |
| --- | --- | --- |
| Variable Name | Data Type | Remarks |
| taxWithheld | double | Function’s return value after computing |

**Analysis**

taxWithheld = grossSalary \* socialTax

**Algorithm**

1. declare variable taxWithheld as double and set as below

taxWithheld = grossSalary \* socialTax

1. return taxWithheld
2. End function

//// End of IOAA for the function getTaxWithheld

\* Figure 5. getNetSalary function

|  |  |
| --- | --- |
| Design of Header for function to compute net salary | |
| Question asked | Answer |
| What is the purpose of the function? | Function computes the netSalary of the employee. The function deducts the taxWithheld from the grossSalary. Then function checks the value of Boolean parameter healthPlan and the value of netSalary. If Boolean parameter healthPlan is true and netSalary after taxWithheld is greather than or equal to $200 for healthPremium then halthPremium is deducted from netSalary computed in previous step, to compute the final netSalary. Depending upon the following situations the netSalary is computed correctly and healthPlanStatusMessage is set accordingly.   1. User opted for health plan and salary after tax deduction is enough to enroll in the health plan, in which case the enrollment is accepted and healthPlanStatusMessage is set accordingly. 2. User opted for health plan but salary after tax deduction is not enough to enroll in the health plan, in which case the enrollment is denied and healthPlanStatusMessage is set accordingly. 3. User did not opt for health plan. Then healthPlanStatusMessage is set accordingly. |
| What is the decision on the name of the function? | getNetSalary |
| Which parameter, will be returned to the calling block by the return statement? | netSalary |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | healthPlanStatusMessage |
| What are the data types of parameters? | double: grossSalary, taxWithheld, netSalary  bool: healthPlan  string: healthPlanStatusMessage |
| Based on above facts, what is the header of this function? | double getNetSalary (double grossSalary, double taxWithheld, bool healthPlan, string & healthPlanStatusMessage); |

**Function input**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable Name | Data Type | Is variable returned by the function using the return statement? | Is variable passed back to the calling block, using pass-by-reference? | Does function need to declare this variable in the function body? |
| grossSalary | double | No | No | No |
| taxWithheld | double | No | No | No |
| healthPlan | bool | No | No | No |
| healthPlanStatusMessage | string | No | Yes | No |
| netSalary | double | Yes | No | Yes |

**Function output**

|  |  |  |
| --- | --- | --- |
| Variable Name | Data Type | Remarks |
| netSalary | double | Function’s return value after computing, refer to analysis |

**Analysis**

\*How to check user have enough money for health insurance

(grossSalary – taxWithheld) > healthPremium

\*If user opted for health plan and salary after tax deduction is enough to enroll

in the health plan then

netSalary = grossSalary – taxWithheld – healthPremium and

healthPlanStatusMessage = healthStatusTrue

\*If user opted for health plan but salary after tax deduction is not enough to enroll

in the health plan then

netSalary = grossSalary – taxWithheld and

healthPlanStatusMessage = healthStatusFalse

\*If user did not opt for health plan then

netSalary = grossSalary – taxWithheld and

healthPlanStatusMessage = healthStatusNone

**Algorithm**

1. declare variable availableHealthPlan as boolean and set as below

availableHealthPlan = (grossSalary – taxWithheld) > healthPremium

1. declare variable netSalary as double
2. If (healthPlan) then
   1. If (availableHealthPlan) then
      1. netSalary = grossSalary – taxWithheld – healthPremium
      2. healthPlanStatusMessage = healthStatusTrue
   2. Else
      1. netSalary = grossSalary – taxWithheld
      2. healthPlanStatusMessage = healthStatusFalse
   3. End if
3. Else
   1. netSalary = grossSalary – taxWithheld
   2. healthPlanStatusMessage = healthStatusNone
4. End if
5. return netSalary
6. End function

//// End of IOAA for the function getNetSalary

\* Figure 6. printResults function

|  |  |
| --- | --- |
| Design of Header for function to print computing results | |
| Question asked | Answer |
| What is the purpose of the function? | Function takes eight arguments and print them on the console. |
| What is the decision on the name of the function? | printResults |
| Which parameter, will be returned to the calling block by the return statement? | None |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | healthPlanStatus |
| What are the data types of parameters? | string: firstName, lastName, healthPlanStatus  double: hoursWorked, payRate, grossSalary,  taxWithheld, netSalary |
| Based on above facts, what is the header of this function? | void printResults (const string & firstName, const string & lastName, double hoursWorked, double payRate, double grossSalary, double taxWithheld, double netSalary, const string & healthPlanStatus); |

**Function input**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable Name | Data Type | Is variable returned by the function using the return statement? | Is variable passed back to the calling block, using pass-by-reference? | Does function need to declare this variable in the function body? |
| firstName | string | No | No | No |
| lastName | string | No | No | No |
| hoursWorked | double | No | No | No |
| payRate | double | No | No | No |
| grossSalary | double | No | No | No |
| taxWithheld | double | No | No | No |
| netSalary | double | No | No | No |
| healthPlanStatus | string | No | Yes | No |

**Function output**

|  |  |  |
| --- | --- | --- |
| Variable Name | Data Type | Remarks |
| firstName | string | printing results to console |
| lastName | string | printing results to console |
| hoursWorked | double | printing results to console |
| payRate | double | printing results to console |
| grossSalary | double | printing results to console |
| taxWithheld | double | printing results to console |
| healthPlanStatus | string | printing results to console |
| netSalary | double | printing results to console |

**Analysis**: No analysis is needed.

**Algorithm**

1. set outputted formatted to two decimal places
2. Print, “Here are the Employee Payroll details.”, EOL
3. Print, “Name: “, firstName, “ ”, lastName, EOL
4. Print, “Hours worked: “, hoursWorked, “ hours”, EOL
5. Print, “Hourly Pay Rate: $”, payRate, EOL
6. Print, “Gross Salary: $”, grossSalary, EOL
7. Print, “Tax withtheld: $”, taxWithheld, EOL
8. Print, healthPlanStatus, EOL
9. Print, “Employee net salary: $”, netSalary, EOL
10. End function

//// End of IOAA for the function printResults

\* Figure 7. goodbye function

|  |  |
| --- | --- |
| Design of Header for function to print goodbye message | |
| Question asked | Answer |
| What is the purpose of the function? | Function gets data input from the user. Since user is required to provide five pieces of data, and a function can only return one value, the other four values are returned by reference. |
| What is the decision on the name of the function? | goodbye |
| Which parameter, will be returned to the calling block by the return statement? | None |
| Which parameter would be populated by the user input and would be passed back to the calling block by reference? | None |
| What are the data types of parameters? | None |
| Based on above facts, what is the header of this function? | void goodbye(); |

**Function input**: No input table is required in this case.

**Function output**: No output table is required in this case.

**Analysis**: No analysis is needed.

**Algorithm**

1. Print, “Thank you for using our program.”, EOL
2. Print, “Please have a pleasant day.”, EOL
3. End function

//// End of IOAA for the function goodbye

**Algorithm**

1. Add all the #include directives, declare global constants
2. declare firstName as string
3. declare lastName as string
4. declare payRate as double
5. declare healthPlan as boolean
6. declare healthPlanStatusMessage as string
7. declare healthPlanStatus as string
8. greeting()
9. declare hoursWorked as double and set as below

hoursWorked = getUserData(payRate, firstName, lastName, healthPlan)

1. declare grossSalary as double and set as below

gorssSalary = getGrossSalary(hoursWorked, payRate)

1. declare taxWithheld as double and set as below

taxWithheld = getTaxWithheld(grossSalary)

1. declare netSalary as double and set as below

netSalary = getNetSalary(grossSalary, taxWithheld, nealthPlan, healthPlanStatusMessage)

1. healthPlanStatus = healthPlanStatusMessage
2. printResults(firstName, lastName, hoursWorked, payRate, grossSalary, taxWithheld, netSalary, healthPlanStatus)
3. goodbye()