

E-Content

IFTM University, Moradabad

Java Programming Notes for BCA/MCA -

| | Java is an Object Oriented programming language developed by Sum Microsystems of USA in 1991 |
|---|--|
| | developed by Sun Microsystems of USA in 1991 |
| | and and wide it |
| | It was originally called Oak by James Goslin |
| | -> one of the inventors |
| | It was originally called Oak by James Goslin one of the inventors of Java! |
| | JAVA = Purely Object oriented |
| _ | - |
| _ | How JAVA Works 1 |
| | Jana is compiled into the pyricode wind them is |
| - | How JAVA Works? Java is compiled into the bytecode and then it is interpreted to machine code |
| | Paris Marian Mariana Planinghar Codall Hill |
| | Source Compiled by to code Interpreted Machine |
| | Source Compiled by te code Interpreted Machine Code |
| | there is a source of the second of the secon |
| | JAVA Installation Go to Google & type "Install JDK" => Installs JAVA JDK Go to Google & type "Install Intellial Idea" => Installs JAVA IDE |
| | Go to Google & type Install JDK" => Installs JAVA JAK |
| | Go to Google & type "Install Intellis I dea => Installs JAVA IDE |
| _ | |
| _ | JDK -> JAVA Development Kit = Collection of tools used for developing and running Java programs |
| _ | |
| | JRE -> JAVA Runtime Environment = Helps in executing programs developed in JAVA |
| _ | by agams developed in JAVA |
| | They were the second |
| _ | The second secon |
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| | |

| | Basic Structure of a Java Program |
|---------------|--|
| | |
| 4351 | backage com-company; -> Groups classes! |
| 61 | Entrypoint into the application |
| 2 1 11 | huldie class Main & |
| | public class Main & public Static Void main (String [] args) & System out println ("Hello World"); |
| 1 | Sustement hintle ("Helle World"); |
| NA VAL | 3 Jysian au pointin (Maria 1900) |
| | 3 inhairs hado phont = AVAL |
| | |
| | Namina Conventions |
| | Naming Conventions For classes, we use Pascal Convention First and Subsequent Characters from a word are Capital letters (uppersse) Example: |
| | Characters from a word are Cabital letters (ubberuse) |
| | Example: |
| | Example: Main, My Scanner, My Employee, Code With Harry |
| | minimale house the same |
| \rightarrow | For functions and variables, we use camellase Convention. Here first character is lowercase and the subsequent |
| | Here first character is lowercase and the subsequent |
| | characters are uppersone like helow: |
| Hit | Characters are uppercase like below: main, my Scanner, my Marks, Code With Harry |
| () | and the same of th |
| | |
| | in to notable = in transletoval AVAL + XIII |
| 4 | well welanted had a didologe and hear |
| b 5 | |
| I STAN | 1 AVA Runting Favorage = Elips In C |
| | AVAL of historical ampression |
| | |

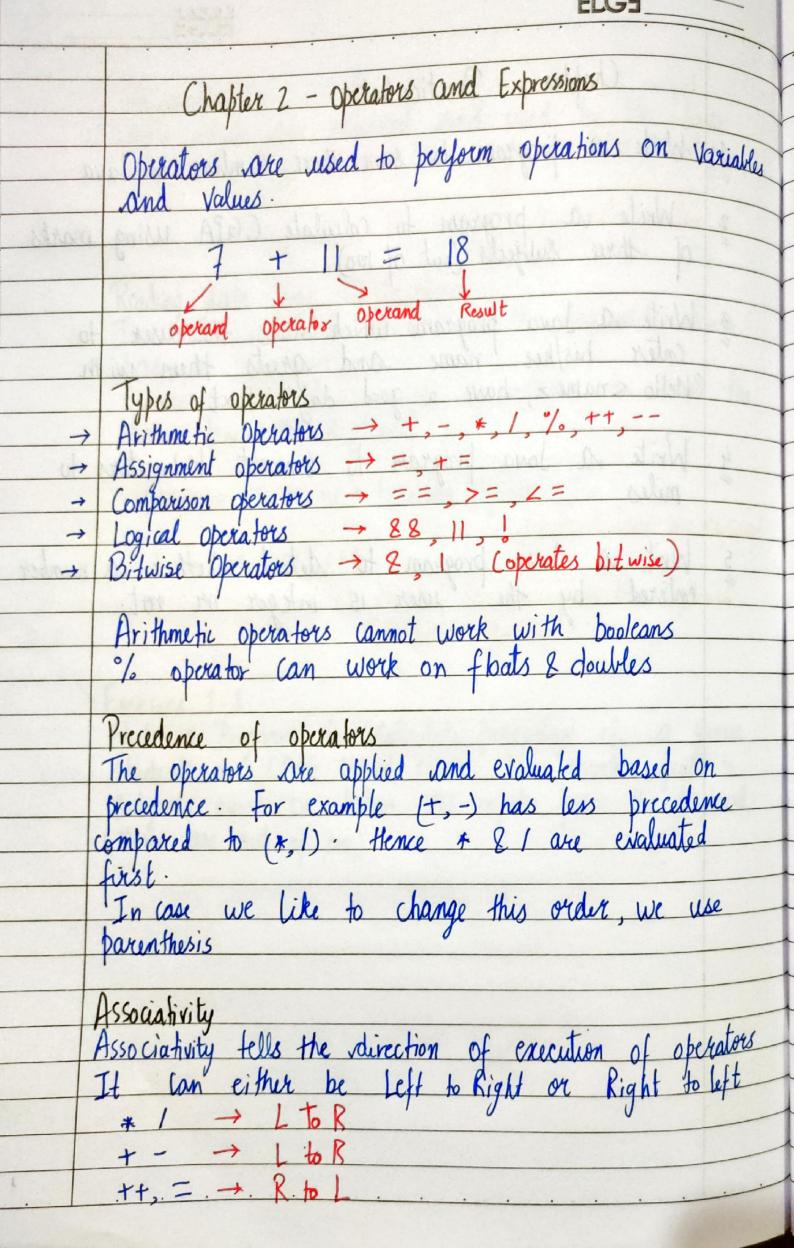
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| - | |
|--------|---|
| | Chapter 1 - Variables and datatypes |
| Timbs: | |
| | Just like we have some rules that we follow to Speak english (the grammar), we have some rules to follow while writing a Java program. The set of these rules is called syntax. Vocabulary & Grammar of Java. |
| | Steak english (the grammar), we have some rules to |
| | follow while writing a Java program. The set |
| 150 | of these rules is scalled syntax. |
| | Vocabulary & Grammar of Java. |
| | 3 - 60 - 1-60 - 4 - 50 - 100 1 - 50 - 100 1 - 50 - 100 1 - 50 - 100 1 - 50 - 100 1 - 50 - 100 1 - 50 - 50 |
| | Variables |
| | A variable is a Container that Stores a Value |
| | A variable is a container that stores a value. This value can be changed during the execution of the program. |
| | of the programment shows and |
| | Example: |
| P | Int number = 8; Value it Stores! Data type variable name |
| | Vata type variable name |
| N. C. | D. L. law declaring a Variable name |
| | Rules for declaring a variable name. We can choose a name while declaring a Java variable if the following rules are followed: |
| | if the following trules are followed: |
| - 18 | Start A county supply of the profits |
| 17 | Must not begin with a digit - int larry; is invalid! |
| 7.7 | Name us case sensitive harry and harry are different! |
| 37 | Should not be a keyword (like Void) |
| 47 | White Space not allowed int Code With Harry: 15 invalid |
| 57 | Can contain alphabets, & character, _ character and digits if the other conditions are met |
| | the other conditions are met |
| | |
| - | Data lypes of a many many analy & to had at |
| 1800 | Data Types Data types in Java fall under the following Categories Primitive Data Types (Intrinsic) Non-Primitive Data Types (Derived) |
| 17 | Primitive Data Types (Intensic) |
| 27 | Non-Primitive Data Types (Derivea) |
| | |
| - | de la constantia del constantia de la constantia de la constantia del constantia de la constantia del constantia de la constantia de la constantia del |

| | Primi five Data Types whan I golded |
|----------|---|
| , | Primitive Data Types Java is Statically typed> Variables must be declared There are 8 primitive data types Supported by Ja byte -> Value ranges from -128 to 127 • Takes 1 byte |
| - 139 | hute - Nahue ranger Gram -128 for 127 |
| Set | · Takes 1 byte |
| | · Default value is 0 |
| C 1 11 | Short - Value ranges from (21/2 to (2)/2 -1 |
| 7.7 | · Takes 2 Kules |
| - 91 | Short - Value ranges from - (2 1/2 to (2)/2 -1 · Takes 2 byks · Defoult Value is 0 |
| mill | land water moment beautiful and many and and |
| 3, | int -> Value ranges from - (232)/2 to (23/2-1 Takes 4 byks De fault Value is 0 |
| | Da Coult Value is Assa |
| | be full yard for and and and and |
| 4 > | float -> · Value ranges from (see Docs) · Takes 4 bytes |
| 11. | |
| A Miller | Default Valueris 0.0f wards in |
| 5, | long -> Value ranges from - (2 1/2 to (2 1/2) |
| 1). | · Takes 8 by les |
| larial! | 1 was wised to a Default Value 1600 as 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 |
| | could not be a troused like soil |
| 67 | double > Value ranges from (Scedocs) • Takes 8 bytes • Default Value is 0.0d |
| - | Takes 8 bytest almond mindred mindred |
| | · Default Value 15 0.0d |
| 7, | Char → Value ranges from 0 to 65535(21-1) • Takes 2 bytes → because it supports • Default Value is '\u00000' |
| l.i | · Takes 2 bytes → because it supports |
| | • De fault Value is '100000' |
| | thought wind and will your half |

| , | |
|---------|---|
| | Keywords and regard ad not salely a more more |
| | Words which are reserved and used by the Java Compiler. They cannot be used as an Identifier. |
| | Compiler. They cannot be used as an Identities. |
| | |
| 1 | Go to clocs oracle Com for a |
| | Go to clocs.oracle.com for a comprehensive list! |
| | Reading Lata from the Keyboard |
| | In order to read data from the keyboard, Java |
| | has a scanner class. |
| | Scanner class has a bit of methods to read the |
| | data from the keyboard |
| | |
| | 5 canner 5 = new Scanner (System in); int 0 - 5. next Tot 1): |
| | Read from the keyboard |
| | THE U. S. INC. |
| o h | Method to read from the Reyboard |
| toh | (Integer in this case) |
| sat his | in need to analy your wine wine y wax of hear of |
| | Exercise 1.1 |
| | Write a Program to Calculate percentage of a given student in CBSE board exam. His marks from 5 |
| dely | student in CBSE board exam. His marks from 5 |
| | subjects must be taken as input from the purposed |
| | (Marks are out of 100). |
| 4 | land from to 101. |
| | Jakhil toolit en 21:01 |
| | Committee of shall shall be an immission |
| | 1 - Charalas Lital |
| | May be broken broken |
| | Jasin Rasic Strains |
| | |
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| | EDG = | |
|-----|--|---------|
| | Chapter 1 - Practice Set | |
| 1 | Write a program to sum three numbers in Jav | (a |
| 2 = | Write a program to calculate CGPA Using of three subjects (out of 100). | marks |
| 3 = | Write a Java program which asks the user - enter his/her name and greets them with "Hello < name >, have a good day" text. | to n |
| | Write a Jova program to convert Kilometers miles | |
| 5 = | Write a Java program to detect whether a entered by the user is integer or not. | number |
| | | |
| | | |
| | | |
| | | |



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| _ | |
|---|---|
| | Quick aug: How will you write the following expressions in Java? |
| _ | expressions in Java? |
| _ | $\frac{x-y}{2}$, $\frac{b^2-4ac}{2}$, $\sqrt{2}u^2$, $u*b-d$ |
| | 2-4, b-4ac, V-u, a*b-d |
| | 2 2a Crio what |
| | Resulting data tube after another operation |
| | following table summarises the resulting data types after |
| | Resulting data type after arithmetic operation following table summarizes the resulting data types after arithmetic operation on them |
| | |
| | $R = b + 5 \rightarrow int$ $b \rightarrow byk f \rightarrow float$ |
| | $R = G + L \rightarrow Int$ S -> Short d -> double |
| | R = l + f -> float i -> inkger c -> character |
| | $R = i + f \rightarrow float$ $l \rightarrow long$ |
| | $R = C + i \rightarrow int$ $P = C + 6 \rightarrow i + i$ |
| | $R = C+5 \rightarrow int$ $R = L+d \rightarrow double$ |
| | $R = f + d \rightarrow double$ |
| | |
| | Increment and Decrement Operators |
| | a++, ++a -> Increment operators -> Data type |
| | Increment and Decrement Operators a++, ++a → Increment operators → Data type a,a → Decrement operators → remains some |
| | |
| | These will operate on all data types except bodeans |
| | Quick Quiz: Tu increment and decrement operators |
| | Quick Quiz: Ty increment and decrement operators on a Java Variable |
| | |
| | a++ → first use the value and then increment ++a → first increment the value then use it |
| | ++ a -> first increment the value then use it |
| | |

| Char a = 'B' summer with out had and well at a the and a the and well at a the and a | 8 | Quick Quiz: What will be the value of the following expression (2). int y = 7; int x = ++y * 8; |
|--|------------|--|
| Perform on them Performs on the transmit opening on them Performs on all data type except to one Performs on all the value and then interneual | 1 | Value of 2? |
| Solve the state of the second of the interval of the second of the secon | 30/ | Char $a = 'B';$ $a + + i \rightarrow a \text{ is } mw'C'$ |
| Sout + 2 - 9 I to + + - + foot Sout + - + - 1 Sout + - + 9 The - + + - + - + - + - + - + - + - + - + | 101-1 | |
| 2 - L+ L + Hoat 2 - L+ L + Long 2 - L+ L - Long 2 - L+ L - Loude 3 - L+ L - Loude 3 - L+ L - Loude 4 - L - - Loude 5 - Loude 5 - Loude 6 | | |
| to the time of the second of the intervent of the second o | Alaman - 3 | A A A A A A A A A A A A A A A A A A A |
| 9 = (+5 - int = 9 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 | | VIBOL A |
| Alwah + b+l = 9 Alwah + b+l = 9 Alwah + b + b - 1 Alwah + b + b - 1 Alwah + b + b a - 1 Alwah + b + b a - 1 Alwah + b + b a - 1 Alwah + b + b + b + b + b + b + b + b + b + | | |
| P = 1 + d - double Available to be headers - Described to the former of the described of the second | | |
| 1 to the terment operators - related in the internet of the in | | # 10 March 19 March 1 |
| 1 to the second operators - Total of the company operators - Total of the second operators - Total ope | | Increment and Decrement Operations |
| Then will operate on all data types except too and Quick One in a concentrate of the secretary of the secre | 2- | |
| Quick and: In increment and herement there have | | 1 De romant operators - reministra |
| 0 to 1 was for your and then insterned | - And | |
| thousand the value the increased to the free that the test the same that | Arth | of a love variable |
| | | the part were the volue and then increased |

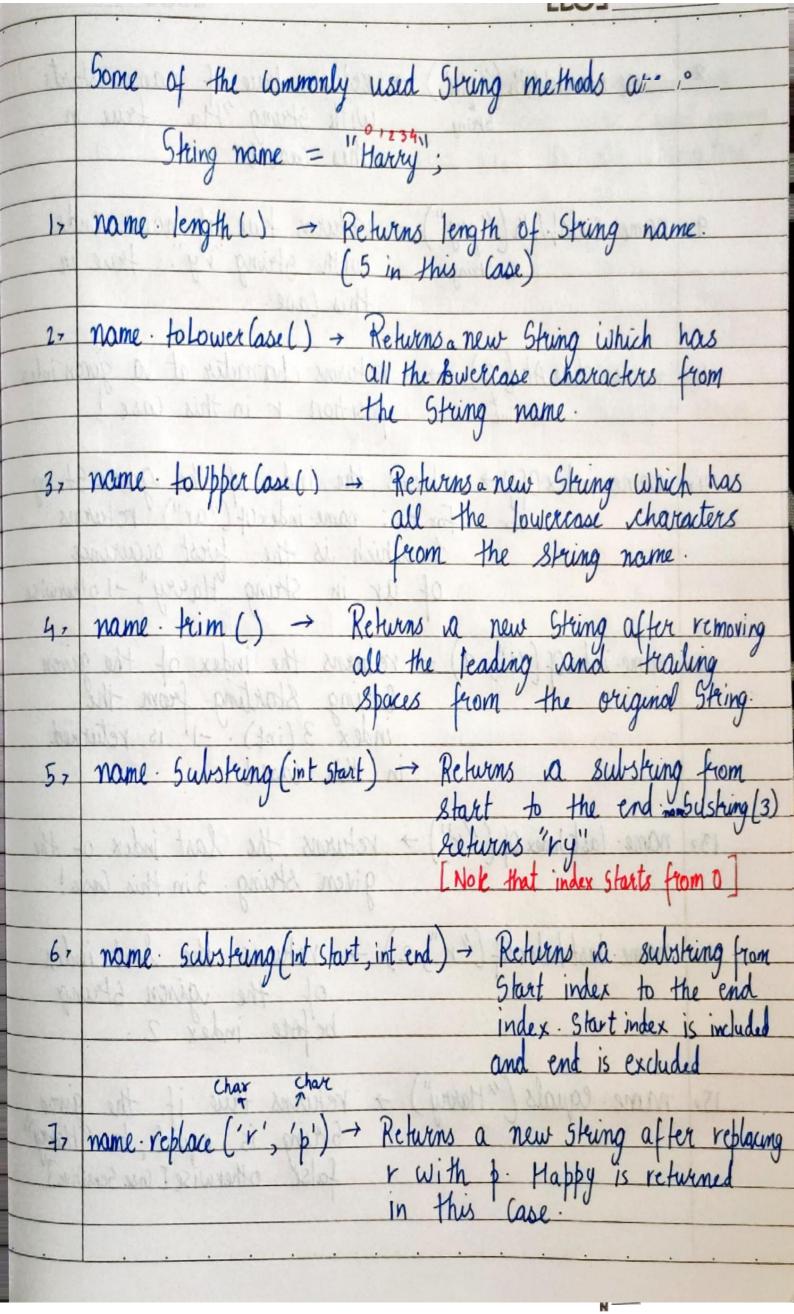
| | Chapter 2 - Practice Set |
|---|---|
| 1 | What will be the result of the following expression |
| | float a = 7/4 * 9/2 |
| 211 | Write a java program to encrypt a grade by adding 8 to it. Decrypt it to Show the correct grade. |
| 3 ===================================== | Use Comparison operators to find out whether a given number is greater than the user entered number or not. |
| 4 2 | estered number or not. Write the following expression in a java program: |
| . 1 | $\frac{\sqrt{2}-u^2}{295}$ |

find the value of the following expression:

int x = 7int a = 7+49/7 + 35/7

Value of a?

| | Chapter 3 - Strings |
|--------|---|
| | |
| naise | A string is a sequence of characters |
| | A string is a sequence of characters A string is instantiated as follows: |
| | |
| A.A | String name; name = new String ("Harry"); |
| trees | mank = new stang (navy); |
| | Gleing is a class but can be used like a data type: [Strings are immutable and cannot be changed] |
| | data type: [Strings are immutable |
| 0 | and (cannot be changed] |
| * | String name = "Harry"; |
| | String name = "Harry"; Reference Deject |
| | Dillowed the I list to I |
| 108250 | later Case ways to print in Java |
| | Different ways to print in Java. We can use the following ways to print in Java: |
| 17 | System. out . print () - No newline at the end! |
| 27 | System. out print () -> No newline at the end! System. out print In () -> Prints a new line at the end |
| 37 | Sustem out brint (1) |
| 4, | System.out. format() |
| - | f er to |
| | System out printf (3/c", ch) % d for int |
| | |
| | % f for float |
| | % c for char |
| | %. 5 for string |
| | String Methods |
| | String methods operate on Java Strings. They can be used to find length of the string, Convert to lowercase, etc. |
| | can be used to find length of the string, |
| | Convert to lowercase, etc. |
| | |



| 8, | name starts with ("Ha") -> returns true if name starts String with string "Ha" true in this case! |
|--------------------------|--|
| | String with String "Ha" true |
| | this case! |
| | nw me |
| 0 | man endellist / 4 mill & reckered by a if home a |
| 77 | name ends With ("ry") -> returns true if name ends string with string "ry" true in |
| | String With String ry. Frue in |
| | this case. |
| 200 | windly marked their west west of the following their |
| 107 | name charAt (2) -> returns character at a given index int position r in this case ! |
| | bosition r in this case |
| | post not a series of |
| Section. | name into NGA volume the into all the augus al |
| 117 | name index Of(s) returns the index of the given string. str For ex: name index Of ("ar") returns |
| 9.18176 | str for ex. name index of ("ar) returns |
| | I which is the first occurrince |
| | name index Of(s) returns the index of the given string. str For ex: name index Of ("ar") returns 1 which is the first occurrence of ar in String "Harry", -1 otherwise |
| Prant Y | |
| 12, | name index Of ("5", 3) -> returns the index of the given |
| Seine | Grung Starting from the index 3 (int)1 is returned in this case! |
| V | index 3 (int) -1 is returned |
| moud. | in this case! |
| (m) | In this time. |
| 10 | nome little of (1/411) - rate and the last it is at the |
| 137 | Thatle last maex of (r) - returns the hast man of the |
| 1.00 | name last Index of ("r") -> returns the last index of the given string. 3 in this case! |
| The second second second | |
| 14, | name last Index Of ("r", 2) -> returns the last index of the given string before index 2. |
| A Line | of the given string |
| 1111 | before index 2. |
| | The Part of the Pa |
| 15, | name equals ("Harry") -> returns true if the given |
| manufacture 1 | name equals ("Harry") -> returns true if the given String is equal to "Harry" false otherwise [case sensitive] |
| 1 | Cles allow vice to constitute 1 |
| | jaise ofnerwise i was sensitives |
| | - SAA AND ALL |

name equals Ignore lase ("harry") -> returns true if two

Grings are equal ignoring

the case of characters. Escape Sequence Characters
Sequence of characters after backslash '\'

= Escape sequence Characters Escape Sequence Characters Consist of more than one characters but represents one character when used within the Strings. Examples: In, It, etc.

newline Tas singlequote backslash letter = "Dark Horry This Java Course is nice

| | ELG3_ |
|-------------------|--|
| ourt Privati M | Chapter 3 - Practice Set |
| 1 | Write a Java program to convert a string to |
| 2 | Write a Java program to replace spaces with underscores. |
| 3 = | Write a Java program to fill in a letter template which books like below: |
| | letter = "Dear < name 1>, Trans a lot" |
| | Replace 4/ name / with a string (some name) |
| 4 | Write a Java program to detect double and triple spaces in a string |
| 5 | Write a program to format the following letter using escape sequence characters. |
| | letter = "Dear Harry, This Java Course is nice Thanks" |
| | The state of the s |
| | 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| | Show the family a street had a first |
| | The Control of the Co |

| (1-11 1. (-1.1.1.1. 1. : 1.4. |
|---|
| Chapter 4 - Conditionals in Java |
| |
| Sometimes we want to watch comedy videos on you lube |
| if the day is bunday. |
| Sometimes, we order junk food if it is our friend's |
| birthday in the hostel |
| You might want to buy an Umbrella if its raining |
| Sometimes we want to watch comedy videos on youTube if the day is Sunday. Sometimes, we order junk food if it is our friend's birthday in the hostel You might want to buy an Umbrella if its raining and you have the maney. You order the meal if also or your favorite bhindi is listed on the menu. |
| You order the meal if also or your favorite |
| bhindi is listed on the menu |
| The toulous of heart some water to explicate founds |
| All these are decisions which depends on a |
| contain condition being met. |
| In Java we can execute instructions on a |
| All these are decisions which depends on a certain Condition being met. In Java, we can execute instructions on a condition being met. |
| |
| Decision making Instructions in Java |
| Decision making Instructions in Java If - Else Statement Switch Statement |
| Switch statement of the statement |
| SWITCH IS N |
| If-else Statement |
| The syntax of an If-Else statement in C looks like that of C++ and JavaScript Java has a Similar Syntax too. It looks like: |
| that of C++ and Java Script. Java has a Similar |
| Syntax too It looks like: |
| OFFICE AN SOUTH OF THE STOLEN |
| if (condition - to - bc - checked) { Statements - if - condition - true; |
| Statements - if - Condition - true; |
| 3 (MA - 99 |
| else & + + 1 = 1 = 20 - 11 |
| Statements - if - Condition - false; |
| 3 |

| Code Example: |
|--|
| int a = 29; if (a > 18) \(\frac{2}{5}\) System out println (" You can drive"); |
| if (a 7 18) } |
| System. out . printin (" you can out ve) |
| The state of their very |
| Note that the else block is optional |
| Relational Operators in Java |
| DILL A TORK ORD LINED TO ENTINUOLE ISTUILIANI |
| (true or false) inside the if statements. Some examples of relational operators are: |
| Some examples of relational operators are: |
| D. HOURSHALL SULLING THE TANK OF THE STATE O |
| Not equals |
| equals greater than Not equals |
| Note: '=' is used for assignment where as '==' is used for equality check. |
| is used for equality check. |
| The time for copy and |
| The condition can be either true or false. |
| at shall be and the felse who to make the |
| Logical Operators |
| Logical Operators 88, 11 and! are most commonly used logical operators in Java These are read as: |
| operators in Java |
| |
| 20 Aug - Hailing) - 1 - strumstoff |
| RR → AND |
| 11 → OR ⇒ Used to provide logic to 1 → NOT our AVA programs |
| , NO |
| |
| |

| - | AND operator |
|--|--|
| | AND operator Evaluates to true if both the condition are true |
| | 2000年1月1日 1900年 1月1日 1月1日 1日 1 |
| | Y & & Y = Y Y → true |
| | $Y & 8 & N = N$ $N \rightarrow false$ |
| | N & 2 & Y = N |
| | N 88 N = N |
| | Il Sintennia; diameter II |
| | OR Operator |
| | OR Operator Evaluates to true when at least one of the conditions |
| - | is true. |
| | Switch - Lose is used when the house to make |
| | y 11 1/2 = 11 / 40 minus y + true |
| | $Y \mid N = Y$ $N \rightarrow false$ |
| The second second | $N \parallel Y = Y$ |
| | NIN=N |
| The state of the s | The transfer of the property of the seal o |
| The second second | Nol Operator |
| | Not Operator Negates the given logic (true becomes false and false becomes true) |
| | belomes true) |
| 1 | 1 V > 1 |
| | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| | i N = Y N → false |
| The same of | else if clause Instead of using multiple if statements, we can also use else if along with if thus forming an if-else- if-else ladder |
| | Instead of using multiple if statements, we can also |
| | use else if along with if thus forming an if-else- |
| | if-else ladder |
| | |
| | Using such kind of logic reduces indents last else |
| | Using such kind of logic reduces indents last else is executed only if all the conditions fail. |
| | |

| | LLG3 |
|--|-----------------------------|
| | |
| if (condition) & 11 Statements; | sol solotodo mo |
| 1/Statements: | d I met at little |
| 3 | the ingenial distriction of |
| else if ? | V S X X X V |
| 115takments; | 1x = 10 2 2 V |
| 3 | May 90 h |
| else { | 1 W +- 1 29 |
| 11 Statements; | V 13 A |
| 3 | la la co |
| regulated at to me tend to ma | Li mil I I I I |
| Switch Case Control Instruction | ALL THE CT CATORING |
| Switch - Case is used when | n 110 have h |
| Switch - Case is used when Choice between number of | allerestive to more a |
| given Variable | without ves for a |
| g water variative | V = V |
| Switch (Vax) { | |
| | NENTH |
| Case C1: | |
| 11 Code: | NO STATE OF |
| | |
| Case Cz: | because tuse |
| 11 Code | |
| bycak; | V = V |
| Case C3: | A = A |
| | |
| 11 Code | SOUND! |
| and and the state of the | |
| - 20 - 10 default : 11 de | w photo if also all |
| 11 Code | 12-612 laddet |
| 3+1 | |
| rela Jean Sidesheel arrubat sipoh | there say purely |
| at the temperature term | if the strongs only fi |
| | |

| A Switch can is rearry | occur within another but in practice this done |
|--|---|
| | TOTAL TOTAL DESIGNATION OF THE PARTY OF THE |
| | "in mar ") intered too mited |
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| DESIGN (SI) | Jon on I" I although by motor |
| | 的。如此,但是自己的自己的自己的,但是是自己的自己的自己的自己的,但是是自己的自己的。 |
| top forth | Average the subjects and take marks Personal of teast 33% in coch subjects and take marks From the subjects and take marks |
| | |
| | and had give you paid pay an |
| in bound name | government up per the Islaho |
| The state of the s | Totale blate Tox |
| | 751 - 5.01 5% |
| | 1001 + 1001 100Y |
| Status. | April 10:01 30% |
| 17 176 | A LA LIA |
| | Mole that there is no tox below |
| A STATE OF THE STA | |
| n interior | built of maspord and a still of |
| | the year girds the sounds |
| 14 | I had don't water to be on I |

| | Chapter 4 - Practice Set |
|---|--|
| | |
| 1 | What will be the output of this program: |
| | |
| | int $a = 10$; |
| | if (a = 11) |
| | if (a = 11) System.out.println ("I am 11"); else System.ouk.println ("I am not 11") |
| | else " I ["I and met II"] |
| | System. out println (I am not 11) |
| | 1 C 1 + white a child |
| 2 | Write a program to find out whether at student |
| | is pass or fail: if it requires total 40% |
| | and at least 33% in each surject to pass. |
| | Assume 3 subjects and take marks his an input |
| | Write a program to find out whether a student is pass or fail; if it requires total 40% and at least 33% in each subject to pass. Assume 3 subjects and take marks as an input from the user. |
| | the tent of tent of tent of the tent of th |
| 3 | Calculate income tax paid by an employee to the government as per the slabs mentioned below: |
| - | government as per the slaws mentioned below. |
| | |
| | Income Slabe Tax |
| | 2.5L - 5.0L 5% |
| | 5.0 L - 10.0 L 20%. |
| | Above 10.0L 30% |
| | The inhit |
| | Note that there is no tax Delow 2.52. Take your |
| | Note that there is no tax below 2.5L. Take input amount as an input from the user. |
| | |
| 4 | Write a Java program to find out the may |
| " | of the week given the number [1 for Monday) |
| | Write a Java program to find out the day of the week given the number [1 for Monday of Trusday and 50 on!] |
| | |
| | |
| | |

| - | Write a Java program to find whether a year entered by the user is a leap year or not. |
|-----|--|
| 6 | Write a program to find out the type of website from the Url |
| 701 | · Com → Commercial website · org → organization website · in → Indian website |
| | Principally there are these types of Jospe in Love |
| | dool stinks of see |
| | Interview to the contract of t |
| | (noitibne) mustart) glistul |
| 2) | If Statement - Institute of the Indianal Andrew Land Manager of the Indianal Andrew Land Manager of the Indianal Land Manager of the Indiana L |
| | L the Condition never because folse the orthogon book gotting concerted. Such a loop is known |

| EE/CI3 | | |
|-------------------|---|--|
| year of . | Chapter 5 - Loop Control Instruction Sometimes We Want our programs to execute a few set of instructions over and over again for example - print 1 to 1000, print multiplication table of 7, etc. Loops make it easy for us to tell the Computer Loops make it easy for us to tell the Computer that a given set of instructions need to be executed repeatedly. | |
| | Types of Loops Primarily. There are three types of loops in Java: | |
| 7 27 37 | for loop | |
| | While loops While (bookean (andition) | |
| | 1/ Statement -> This keeps executing as long as the condition is true. | |
| | If the condition never becomes false, the while loop keeps getting executed Such a loop is known as an infinite loop. | |
| | | |

| | Quick Quiz: Write a program to print natural numbers from 100 to 200. |
|--|---|
| | from 100 to 200. |
| I | THE PROPERTY OF LAND AND AND AND AND AND AND AND AND AND |
| | do while loop This loop is similar to a while loop except the fact that it is guaranteed to execute at least once |
| | This loop is similar to a while loop except the fact |
| | that it is guaranteed to execute at least once. |
| | This for loop Recho Rumming until 1 becomes |
| | do 3 |
| | 11 code ₹ while (condition); → Note this Semicolon |
| | ₹ while (condition); -> Note this Semicolon |
| | |
| | while > checks the condition & executes the code do-while > Executes the code & then checks the condition |
| | do-while > Executes the code & then checks the condition |
| ı | i northead add variated in miladaser |
| | Quick Quiz: write a program to print first n natural numbers using do-while loop. |
| | natural numbers using do-while loop. |
| | loop the contral is sont outside the loop. |
| | For Loop |
| | The syntax of a for bop looks like this: |
| The second second | Light American State of Light State of Light Colors |
| | for (initialize; check book expression; update) { |
| | 11 Code: At a model at leastness and |
| ALC: NAME OF PERSONS ASSESSMENT ASSESSMENT O | Thus skipping everything below "Continue" & inside |
| | the loop for that "torration as |
| | A for loop is usually used to execute a piece of |
| | A for loop is usually used to execute a piece of Code for specific number of times |
| | |
| | Quick aug: Write a program to print first node numbers using a for loop. |
| | odd numbers using a for loop. |
| | |
| | |

| numbers : | Decrumenting for loop |
|-----------|--|
| | |
| | for (i = 7; i!=0; i) { Syskem out println (i); |
| | System out println (i); |
| To | - into the good shall a set taliana de dal sulla |
| | That it is Augustated to execute at the take |
| | This for loop keeps running until i becomes o. |
| | Quick Quiz: Write a program to print first n natural numbers in reverse order |
| | bush ett it |
| Erm | break statement. The break statement is used to exit the loop irrespective of whether the condition is true or false. |
| 1,000 | is so sheeting of whather the condition is less |
| | or false. |
| · · da | whomeway o "break" is encountered inside the |
| | Whenever a "break" is encountered inside the loop, the control is sent outside the loop. |
| | dool rol |
| | Continue statement |
| | The continue statement is used to immideately |
| | move to the next iteration of the bop. |
| | The control is taken to the next iteration |
| | thus skipping everything below "Continue" inside the loop for that iteration. |
| | the loop for that iteration. |
| | A for loop is subunder word to execute a piece |
| 1 | In a Nut Shell break statement Completely exits the loop |
| 17 | Continue Stokement Shihe the bouting |
| 77 | continue statement skips the particular iteration of the loop. |
| | of the wop. |
| | |
| | |
| | |

| - | |
|-----|--|
| | Chapter 5 - Practice Set |
| | and tem the |
| 1 | Write a program to print the following pattern |
| " | 8 - At most once |
| | * * * * |
| | * * * |
| | * * |
| | * |
| 2 | Write a program to sum first n even numbers using while loop. |
| - 1 | using while loop. |
| | |
| 3 | Write a program to print multiplication table of a given number n. |
| - | a given number n. |
| | |
| 4 | Write a program to print multiplication table of |
| | |
| 5 | Write a program to find factorial of a given number using for loops. |
| i | number using for loops. |
| | |
| 6 | Repeat 5 using while box |
| | |
| 1 | Repeat 1 using for/while loop |
| 2 | What can be done using one type of loop can also be done using the other two types of loops - True or False. |
| 8 | can also be done using the other two types |
| | of loops - True or False. |
| | |
| 9 | Write a program to calculate the sum of the numbers occurring in the multiplication table of |
| " | numbers occurring in the multiplication table of |
| | 8. |
| - | |

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|------|--|
| lo | 17 At least once |
| | 2> At least twice 3> At most once |
| 11 | Repeat 2 using for loop. |
| | 3 |
| 20 | 2 thate a program to sun first n even number white last. |
| 40 | est thirt in program to print multiplication table |
| P | ex Water a program to print multiplication talks |
| 101 | 5 Write a program to find fortarial of a divide a state of a state |
| | fed aline prize 2 totals |
| | good alway for fusue t soft |
| 25 | of to stut and poise and ad ala mas |
| -16: | of whoops with our Fulse of Fulse |

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| | Chapter 6 - Arrays |
|----|---|
| 1 | that have a faired boxettant thick did |
| | Array is a collection of similar types of data |
| | Use Case: Storing marks of 5 Students |
| | |
| | int [] marks = new int [5] => [data Type ArrName;] reference object |
| | reference object |
| | $0 1 2 3 4$ $\rightarrow 5 \times 4 = 20$ bytes |
| | marks object |
| | for inties is another brook into |
| | |
| | Array elements can be accessed as follows |
| | marks [0] = 100 |
| | marks [1] = 70 |
| | => Note that index Starts from 0 |
| | the change of law arms in |
| | marks [4] = 98 |
| | |
| | So in a nut shell, this is how array works: |
| | THOUGH CHANGE AND AREA DO LOURS AND A LINE OF |
| 17 | int [] marks; -> Declaration! |
| | int [] marks; marks = new int [5]; Memory Allocation! |
| | |
| | int [] marks = new int [5]: -> Dechration + Memory Allocation! |
| 37 | int[] marks = { 100, 70, 80, 71, 98} - Dedare + Initialize! |
| | A CONTRACTOR LANGUAGE STATE OF THE STATE OF |
| | Array indices starts from 0 and gocs till (n-1) |
| | Array indices starts from 0 and goes till (n-1) where n is the size of the array. |
| | |

Arrays have a length property which gives the length of the array marks length > gives 5 if marks is a reference to array with 5 elements Displaying an Array
An varray can be displayed using a for loop: for (int i=0; i < marks length; i++)

Sout (marks [i]): => Array Traverse

7 Quick Quiz: Write a Java program to print the elements of an array in reverse order. For-each bob in Java Array elements can also be traversed as follows: for (int element: Arr) {
Sout (element); => Prints all the elements

Multidimensional Arrays are Array of Arrays
Each element of a M-D array is an array itself
marks in the previous example was a 1-D array.

Multidimensional 2-D Array A 2-D array can be created as follows: int [][] flats = new int [2][3] L> A 2-D array of 2 rows +3 Columns We can add elements to this array as follows & 50 on! This 2-D array can be Visualised as follows:

[0] [1] [2]

Col 1 (col 2 (col 3) [0] Row 1 (0,0) (0,1) (0,2) [1] Row 2 (1,0) (1,1) (1,2) Similarly a 3-D array can be created as follows: String [1[][] arr = new String [2][3][4] drite a lora program to find whether an

| enanger of | CAND |
|------------|--|
| , | Chapter 6 - Practice Set |
| 1 | Create an array of 5 floats and calculate their Sum. |
| 2 | Write a program to find out whether a given integer is present in an array or not. |
| 3 | Calculate the average marks from an array containing marks of all students in Physics using for each loop. |
| 4 | Create a Java program to radd two matrices Of Size 2 x 3. |
| 5 | Write a Java program to reverse an array |
| 6 | Write a Java program to find the maximum element in an varray. |
| 7 | Write a Java grogram to find the minimum element in a Java array! |
| 8 | Write a Java program to find whether an array is sorted or not. |
| | |

Chapter 7 - Methods in Java Sometimes our program grows in size and we want to separate the logic of main method to other methods other methods for instance - If we care calculating average of a number pair 5 times, we can use methods to avoid repeating the logic. DRY = Dont Repeat Yourself. Syntax of a Method A method is a function written inside a class. Since Java is an Object Oriented language, we need to write the method inside some class data Type name () { Following method returns sum of two numbers int my Sum (int a, int b) { int c = a+b; Calling a Method A method can be called by creating an object of the class in which the method exists followed by the method call: Calc obj = new (alc(); -> Object Creation obj. mySum (a, b); -> McHod call upon an object

The values from the method call (a and b) are copied to the a and b of the function my sun. Thus even if we modify the values a and b inside the method, the values in the main method will not change.

When we don't want our method to return anything, we use void as the return type

Static keyword is used to associate a method of a given class with the class rather than the object. Static method in a class is shared by all the objects

Process of method invocation in Java Consider the method Sum int Sum (int a, int b)

return atb;

The method is called like this:

(alc obj = new (alc();

c = obj. sum (2,3)

The values 2 and 3 are copied to a and b and then a+b=2+3=5 is returned in c which is an integer.

Note: In case of Arrays, the reference is passed. Same is the case for Object passing to methods.

Method Overloading Two or more methods can have same name but different parameters. Such methods are called Overloaded methods. Void foo () Void foo (int a) => Overloaded function foo int foo (inta, intb) Method overloading cannot be performed by changing the return type of methods Variable Arguments (Varargs)
A function with vararg can be created in Java
using the following Syntax: public Static void foo (int ... arr) 11 arr is available here as int [] arr for can be called with Zero or more arguments like this: foo (7) foo (7,8,9) foo (1,2,7,8,9) We can also create a function bor like this public static void bar (int a, int arr) 1/ code Alkast one integer is required now bar can be called as bar(1), bar(1,2), bar(1,7,9,11) etc.

A function in Java can call itself 5uch calling of function by itself is called recursion.

Example: Factorial of a Example: Factorial of a number factorial (n) = n * factorial (n-1) Quick Quiz: Write a program to calculate (recursion must be used) factorial of a number in Java?

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|-------|---|
| saate | Chapter 7 - Practice Set |
| 1 | Write a Java method to print multiplication table of a number n. |
| 2 | Write a program using functions to print the following pattern: |
| | * |
| | * * |
| | * * * * |
| | |
| 3 = | Write a recursive function to calculate sum of first n natural numbers |
| 4 = | Write a function to print the following pattern |
| | * * * |
| | * * * |
| | * * |
| | |
| 5 | Write a function to print nth term of fibonacci Sexus using recursion. |
| | |
| 6 | Write a function to find average of a set of numbers passed as varguments |
| | Repeat 4 using Recursion. |
| 8 | Repeat 2 using Recursion |

| 9 10 | Write a function to convert Celsius tempera into fahrenheit. Repeal 3 using iterative approach. | iture |
|---------|--|----------------|
| the | Ante a program using functions to print | 5/2 |
| | | 25 (1 m) 18 |
| 40 | Write a resurrance hunchion to entendets sum like in natural numbers | 00/1 |
| 1030 | Write a function to hint the fallowing both | 100 |
| DYD | Write a function to trint not team of fine sexus using procursion. | 10011 |
| 1812000 | Note of removered passed as consuments. Rebeat 4 using Percursion | 1101 |
| | Repeat 2 Using Recursion | 100 14 |

| | Chapter - 8: Introduction to OOPs |
|---|---|
| | 2 puncolor and primate and |
| | Object Oriented programming tries to map code |
| | Object Oriented programming tries to map Code instructions with real world making the code Short and easier to understand |
| | Chart and easier by under chard |
| | STIPL WILL CASION TO WHOUS TAIM |
| | 1/1/2 : 01 / 60: 1/ 1/ 1/ 1/ |
| | What is Object Guented Programming |
| | Solving a problem by creating objects is one |
| | of the most popular approaches in programming. |
| | What is Object Oriented Programming Solving a problem by creating objects is one of the most popular approaches in programming. This is called Object Oriented Programming. |
| | resented shall my more with selection to |
| | What is DRY? |
| | DRY Strands for - Do not beheat unusuall |
| | DIVI STORMS TO LO HOL PURPLE YOUNGET |
| | DRY Stands for - Do not repeat yourself Focuses on code reusability |
| | - DURGO D WI TRAIDE |
| | Class |
| | A class is a blueprint for creating objects. |
| - | TANK STORE DON SERVICE OF RESPONSE |
| | JEE => filled by an Student => Application for |
| | JEE => filled by an Student => Application for that Student |
| | sness the mail which is not the little |
| | Class => Object Instantiation => Object |
| | |
| 1 | Create a valid |
| 1 | object. |
| | Object Rupries & S. J. S. Supries & |
| | An Object is an instantiation of a class 111 - al |
| I | An Object is an instantiation of a class. When a class is defined, a template (info) is defined. Memory is allocated only after object instantiation. |
| 1 | allocated only after object instantiation |
| 1 | my suffer object instantiation. |
| 1 | the same than a first the same than the same the same the same than the |

| | How to model a broblem in OOPs |
|-------|--|
| | How to model a problem in OOPs We identify the following: |
| | alal do de and parameters to the doctor |
| 1 | Noun -> Class -> Employee |
| | Noun → Class → Employee Adjective → Attributes → name, age, Salary Verb → Methods → get Salary (), increment () |
| | Verb -> Methods -> get Salary (), increment () |
| | AND STATE COLORS AND STATE CONTRACTOR |
| 3 | OOPs Terminology |
| 17 | OOPs Terminology Abstraction - Hiding internal details [show only essential info!] |
| | A STATE OF THE STA |
| | > Use this phone without bothering about how it was made |
| | about how it was made |
| | C 13 Stands for of - 10 not repeat yourself |
| 2, | Encapsulation - The act of putting various components together (in a capsule). |
| | together (in a capsule). |
| | and the sea Clab of the settle section |
| | > Laptop is a single entity with Wifi + Speaker + Storage in a single box! |
| | START T STOTAGE IN a SINGLE DOX! |
| | In Java encapsulation simply means that the |
| | In Java, encapsulation simply means that the Sensitive data can be hidden from the users |
| | |
| 37 | Inheritance - The act of deriving new things from |
| | Inheritance - The vact of deriving new things from existing things. |
| | |
| | Rickshaw => E-Rickshaw |
| 228 2 | Phone => Smart Phone |
| 4 | Implements DRY! |
| 1. | Polymonthiam - One entity was (|
| 47 | Polymorphism → One entity many forms |
| | Smartphone -> Phone Smartphone -> Calculator |
| | indication of the street of th |
| | |

Writing a Custom Class
We can write a custom class as follows: public class Employee 2 int id; → Attribute 1 String name; → Attribute 2 3 Any real world Object = Properties + Behaviour
Object in OOPs = Attributes + Methods. A class with Methods We can add methods to our class Employee as public class Employee & public int id; public String name; public int get Salary () 3 1/code public void get Details () {

// code

| | Chapter 8 - Practice Set |
|----|--|
| | Crape o |
| 1 | Create a class Employee with following properties and methods: |
| - | ortale in criss property |
| | Charles (by least) (i. 1) |
| 0 | Salary (property) (int) |
| 0 | get Jalary (method returning int) |
| 0 | name (property) (String) |
| ~ | get Name (method returning string) |
| 0 | get Salary (method returning int) name (property) (String) get Name (method returning String) Set Name (method changing name) |
| | Create a class cellphone with methods to print |
| 2 | create a class comprise with the trace |
| | Create a class cellphone with methods to print "ringing.", "Vibrating." etc. |
| 20 | 1 + a class 60 at with a mother to initialize its |
| 3 | create a class square with a method to introduce to |
| | Create a class Square with a method to initialize its side, calculating area, perimeter etc. |
| 1. | THURS CALL |
| 4 | Create a class Rectangle 8 repeat 3 |
| - | Cot a class Tomble H: Con Packets Games |
| 5 | Create a class Tommy Vecetti for Rockstar Games Capable of hitting (print hitting.), running, fixing ek |
| | Capable of hitting (print hitting), hunning, fixing ex |
| 1 | 01.1 / 1. |
| 6 | Repeat 4 for a Circle. |
| | S () 21 ma LIAD abov and |
| | 360) 1 |
| | |
| | |
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| | |

Chapter 9 - Access Modifiers & Constructors Access Modifiers Specifier where a property/method is accessible There are four types of access modifiers in Java: 1. Private 2> Default 3, Protected - About house a new Employed I 4, Public Getters and Setters Getter - Returns the Value [accessors] Setter -> Sets/Updates the value [mutators] L'and sud 1 = amas public class Employee & private int id; private String name; public String get Name () { return name; public void Set Name () { this name = "Your-name"; public void SetName (String n) { this name = n;

Quick Quiz: Use these getters and setters from the main method. Constructors in Java
A member function used to initialize an object
While creating it. Employee harry = new Employee(); harry Set Name ("Harry Bhai"); In order to write our own constructor, we define a method with name same as class name public Employee () {

name = "Your Name"); Constructors can be overloaded just like other methods in Java. We can overload the Employee public Employee (String n) {

name = n; Note: 1 Constructors can take parameters without being overloaded. 3 There can be more than two overloaded constructors

| | Quick | auiz: | Overload initialize | the the | Employee Salary | Const to Rs | tuctor 10,000 | to |
|---|-------|-------|------------------------|---------|--------------------|----------------|------------------|----|
| | | | | | 0 | | | |
| | | | | | | | | |
| | | | | | | | | |
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| -61 | Chapter 9 - Practice Set |
| 1 | Create a class Cylinder and use getters and setters to set its radius and height. |
| 2 | Use 1 to calculate surface area and Volume of the Cylinder. |
| 3 | Use a constructor and repeat 1 |
| 4 / | Overload a Constructor used to initialize a rectangle of length 4 and breadth 5 for using custom parameters |
| 5 | Repeat O for a sphere |
| | |
| | |
| | |
| | |
| | The company of the second seco |
| | |
| | |

| _ | |
|-----|--|
| - | Chapter 10 - Inheritance |
| | Inheritance is used to borrow properties & methods from an existing class |
| | Phone] -> [Smort Phone] |
| 11 | Super Class SubClass extends Super Class |
| | Declaring Inheritance in Java Inheritance in Java is declared using extends keyword |
| | Superclass |
| | Subclass catends the superclass |
| 19 | More Examples Vehicle Animal Animal Vehicle |
| 101 | Car Dog Cat Truck |
| (a) | Some the prisent along the case use Carbot Day |
| 100 | When a class inherits from a superclass, it inherits parts of superclass methods and fields. Java doesn't support multiple inheritance ie hub classes Commot be super classes for a subclass. |
| | Code Example Inheritance in Java is declared using extends keyword |
| | |
| | public class Dog extends Animal € > Inheriting Dog from Animal Class!! |

| | Quick Quiz: Create a class Animal and ? |
|----------|--|
| | Quick Quiz: Create a Class Animal and Derive another class Dog from it. |
| West | with a strated would be here is a state of |
| | Constructors in Inheritance |
| | When a Derived class is extended from it a |
| | the Constructor of the Base day |
| | first followed by the complexities at all the |
| | When a Derived class is extended from the Base class the Constructor of the Base class is executed first followed by the constructor of the derived class. |
| | For the following Inheritance hierarchy, the constructors are crecuted in the order (1) + (2) + (3) |
| | are crecuted in the order of the constructors |
| L Non | |
| | C1 → Parent |
| 1 | TARREST CONTRACTOR |
| | C2 - child Constructors execute in top to bottom order! |
| A place | Grand child |
| | |
| | Constructors during Constructor Overloading |
| | When there are multiple constructors in the hand |
| | class the constructor without any formation |
| | Called from the child class. |
| | When there are multiple constructors in the parent class, the constructor without any parameters is called from the child class. If we want to call the constructor with parameters from the parent class, we can use super keyword |
| | from the parent class we can use subset builted |
| | |
| | Super (a, b); -> Calls the constructor learn the |
| 38310 | Super (a, b); -> Calls the constructor from the parent class which takes 2 Variables |
| | the sub-classes has a sub-class. |
| | this keyword |
| | this is a way for us to reference an abject of |
| 1 June | this is a way for us to reference an object of the class which is being created/referenced. |
| | |
| - Joseph | this area = 2 > this is a reference to current object |
| | Letter De la Color |
| | |

Super Reyword
A reference variable used to refer immediate parent class → Can be used to refer immediate parent class instance variable

→ Can be used to invoke parent class methods.

→ Can be used to invoke parent class constructors. Method Overriding

If the child class implements the same method present in the parent class again, it is known as method overriding

Redefining method of super class!

(in sub class) When an object of subclass is created and the overrided method is called, the method which has been implemented in the subclass is called a its code is executed. Dynamic method dispatch Consider the following inheritance hierarchy Super > meth 2 1 Sub - meth 2 (overriden) @ Scenario 1 → Super obj = new Sub() → Allowed (Obj. meth 2() → ② is called (Method of object)

obj. meth 3() → Not Allowed (Object) Scenario 2 > Sub obj = new Super () > Not Alburd (8) This is known as Dynamic method dispatch and is used to acheive run time polymorphism in Java.

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| | |
| | Chapter 10 - Practice Set |
| class | Instal similar when a hour dinis some |
| 1 | Create a class Circle and use inheritance to use |
| ialshe | Create a class Circle and use inheritance to create another class Cylinder from it. |
| 0 | long by used to invoke sevent char methods. |
| 1 | Create a class Rectangle and use inheritance to create another class Cuboid. Try to keep it as close to real world Scenario as possible. |
| , | another class cuboid. Try to keep it as close |
| A | real world Scenario as possible. |
| | I to the child class in beginning the same method |
| 3 | Create methods for area and Volume in 1 |
| 4 | |
| - | att and for area & volume in (2). Also create |
| Lohine | Create methods for area & volume in (2). Also create getters and setters |
| 1 5 | What is the half of subdays to trade me methy |
| , | What is the order of Constructor execution for the following inheritance hierarchy: |
| | metarchy: hallas at stability and mi |
| | 12 |
| | THE REPORT OF THE PARTY OF THE |
| | Derived 1 Derived 1 Derived 1 Derived 1 |
| | |
| | Derived 2 |
| | L. marks trucker (2) |
| | Derived 2 Obj = new Derived 2(); Which constructor(s) will be executed 8 in what order? |
| | Which constructor(5) will be executed a in 1st tout |
| - 4 | Charles of the control of the contro |
| | Object of Makal) + Not Allowed (D) |
| | |
| 1 | Standing of Constitution = 190 grap the silver of |
| | |
| et h | This is promote as Dynamic method dispatch, and is not |
| | The second secon |

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| Chapter 11 - Abstract Classes & Interfaces |
|--|
| The state of the s |
| What does Abstract (class) mean ? |
| What does Abstract (class) mean ? Abstract in english means -> existing in thought or as an idea without concrete existence |
| an idea without concrete existance |
| and interact |
| Abstract method |
| Abstract method A method that is declared without an implementation |
| abstract void move To (double x, double y) |
| without podiest backet |
| Abstract Class |
| If a class includes abstract methods, then the class itself must be declared abstract, as in: |
| itself must be declared abstract, as in: |
| The state of the s |
| public abstract class Phone Model & |
| abstract void switchoff(); 11 more code |
| 11 more code |
| A PART OF THE PROPERTY OF THE PART OF THE |
| A shrong almost should be a health |
| When an abstract class is subclassed, the subclass is subclassed, the subclass is subclassed, the subclass in parent class implementations for all of the methods in parent class. If it doesn't, it must be declared abstract |
| usually provides implementations for all of the mericas |
| in parent class. If it aboesn't, it must be acclared |
| abstract |
| A C II Thomas and I'm I QU had a blow |
| An Example |
| Shape Shape Circle Rectangle Rhombus |
| Aldred door we label t |
| Circle Rectangle Rhombus |
| and on the substitute dillerer throught in the |

Note - It is possible to create reference of an abstract class.

It is not possible to create an object of an abstract class

We can also assign reference of an abstract class to the object of a concrete subclass. Interfaces in Java
Interface in english is a point where two systems meet and interact TV Buttons [Human] [3] In Java interface is a group of related methods with empty bodies An Example I was housed askillant has interface Bicycle ?

Void apply Brake (int decrement);

Void speed up (int increment);

3 class AvonCycle implements Bicycle {
int speed = 7; void apply Brake (int decrement) {

Speed = Speed - decrement; Void Speed Up (int increment) {

speed = Speed + increment; Abstract class vs Interfaces We can't extend multiple abstract classes but we can implement multiple interfaces at a time. Interfaces are meant for dynamic method dispatch

and run time polymorphism Is multiple inheritance allowed in Java?
Multiple inheritance face problems when there exist
methods with same signature in both the super Due to such problems, Java does not support multiple inheritance directly but the similar Concept can be acheived using Interfaces

A class can implement multiple Interfaces and extend a class at the same time. Note: 10 Interfaces in Java is a bit like the Class Dut with a significant difference.

The Interface can only have method signatures,

constant fields and default methods. 3 The class implementing an Interface needs to On declare the methods (not fields)

(3) You can create a reference of Interfaces but

not the Object 3 Interface methods are public by default Default methods An interface can have static and default methods. Default methods enable us to add new functionality to Existing Interfaces.

This feature was introduced in Java 8 to ensure backward compatibity while updating an Interface.

Classes implementing the interface need not implement the default methods. Interfaces can also include private methods for default methods to use.

Inheritance in Interfaces Interfaces can extend anothe interfaces: bublic interface Interface 1 & Void meth 1 (); public interface Interface 2 extends Interface 1 \(\frac{1}{3} \) Remember that interface cannot implement another interface, only classes can do that! Polymorphism using Interfaces @ Cell Phone @ GPS D Camera @ Media Player Similar to Dynamic method dispatch in Inheritance GPS g = new Smart Phone (); → Can only use GPS methods

Smart Phone s = new Smart Phone (); → Can only use Smart Phone methods Implementing an Interface forces method implementation.

| | EDG3 |
|-----|---|
| | Chapter 11 - Practise Set |
| 1 = | Create an abstract class Pen with methods Write() and refill() as abstract methods |
| 2 | Use the Pen Class from Q1 to create a Concrete class Fountain Pen with additional method change Nib() |
| 3 = | Create a class Monkey with jump () and bite() Methods Create a class Kuman which inherits Hhis Monkey class and implements Basic Animal interface with eat() and skep methods |
| 4 | Create a class TelePhone with ring () lift() and disconnect () methods as abstract methods. Create another class Smart Telephone and demonstrate polymorphism |
| 5 / | Demonstrate polymorphism using monkey class from dus. |
| 6 | Create an Interface TV Remote and use it to inherit Another Interface Smart TV Remote. |
| 7 | Create a Class Tv which implements Tv Remote interface from Q6 |
| | |

Chapter 12 - Packages

| | Chaplet 12 Tanages |
|------------------------|---|
| | Interpreter ve Compiler |
| | Interpreter vs Compiler Interpreter translates one statement at a time into mache Code: |
| | Code! |
| | Compiler scans the entire program and translates who of it into machine code. |
| | mathod change Miller and the second of the |
| | Interpreter Compiler |
| hdi | I DUDY K I during While tolder (ADI) The BIDIA I |
| iku | * One statement at a time |
| 10 | * One statement at a time |
| . 11 | * Partial execution if * No execution if an error occurs |
| 1 11 | |
| <u>Shore</u> Ringso | # Easy for programmers * Usually not as easy as Interpreted ones |
| | maindremulation |
| | Is Java Compiled or Interpreted? |
| 4 | Is lava Compiled or Interpreted? Java is a hybrid language -> both compiled as well as interpreted |
| | sus well sus mitagrada |
| Nach | Compiled |
| | Java File Compiled Class File Can be used harry class by Java interpreter |
| 1 | by kode |
| hs N | A MANUAL STATE OF THE STATE OF |
| - | A JVM can be used to Interprete this bytecode |
| - | A JVM can be used to Interprete this bytecode This bytecode can be taken to any platform (Win/Mac/Linux) for execution Hence Java is platform independent (write once run everywhere) |
| | for execution |
| → | Hence Java is platform independent (write once run everywhere) |
| | |

| | Executing a Java Program | | |
|---------|---|--|--|
| | Main which takes - trees used the second | | |
| | Javac Harry Java -> Compiled Java Harry Class -> Interpocked | | |
| 1000 | Jara Harry Class - Interpreted | | |
| | aight will form be to | | |
| Ass. of | So fare the execution of our program was being managed by intelly Idea. We can download a source and editor like VS Code to Compile 8 execute our Java programs. | | |
| | managed by intelligent ldes. | | |
| | lele con develocal a source editor like | | |
| 7 | VC () I () I'L ? a + b box one | | |
| | 15 tale to compile & execute our Java programs. | | |
| | | | |
| | Packages in Java | | |
| 2011 | A parkage is used to group related classes. | | |
| | Packages help in avoiding name conflicts | | |
| (No | There are two types of packages: | | |
| * | Built in backages - Java API | | |
| * | A package is used to group related classes. Packages help in avoiding name conflicts. There are two types of packages: Built in packages - Java API Vser defined packages - custom packages | | |
| | Public Y Y | | |
| | Song. mb3 photos Songs photos | | |
| | | | |
| | bhoto 2. Jpg Song 3 mp3 Videos Video 1 mp4 Video 2 mp4 os folders | | |
| | Vide 1 mpt Video 2 mpt os folders | | |
| | | | |
| | | | |
| | 1. class this. Java my mb3 => | | |
| | 1. class this. Java my.mp3 => Song. Java harry. Java as packages | | |
| | | | |
| | Vsing a Java package | | |
| | | | |
| | import java larg * -> import everything from Java larg | | |
| | import java larg * import java larg string import String from Java larg s = new Java larg String ("Harry") Use without importing | | |
| | S - news Java long String ("Houry") -> Use Without importing | | |
| | | | |
| | | | |
| 2000000 | | | |

| EEXE | • • • | • • | | ED | 33 |
|---|-------------------|--------------------|-----------------|------------|-----------|
| Creating a p Javac Harry J javac - d. Ha | ackage | Program | Java | D pr | aturar |
| Javac Harry | $cwa \rightarrow$ | Creates + | arry-cli | us | |
| javac - d. Ho | rby lova - | creates | a pack | rge fold | er |
| | | creates 1 | We can | keep 1 | adding |
| | | | to a | ockage li | ke this |
| We can also cre | eate inner | e backage | by | adding | packag |
| as backage no | me | and of | idni . | ud V | folder |
| Os package no These packages | once cr | ceated can | be i | ised | Jan C |
| by other class | is wo | l execut | (aprifile | -to- | ola) a |
| • | | | | | |
| Access Modifiers | in Java | | a va | MI | apala |
| Access modifiers | determi | ne wheth | er othe | r class | ses Can |
| a particula | r field c | n invoke | a pa | cticular | method |
| Access modifiers a parficula Can be put | rlic, priv | ate, protec | ed or | default | (no ma |
| | | . My askal. | T Win | MEMORI - 1 | ML JIMY |
| Modifier | Class | 'lackage | Su Su | bclass | World |
| Public Proketed | y | <u> </u> | | y | у |
| Tokalca | y | y | 90 | C Made | N |
| Default (no) | / | ATTION THE | Edm | N | N |
| Privak | L) LA | 00 | 140 | N | Ŋ |
| <u> </u> | | | | 4 | |
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| | Lagrania | of the second | uar <u>ella</u> | v · Auth | MADE |
| | afresas | 1 00 | Mad - HA | and n | Jant Emor |
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| | | | frankley. | ANNY 1 | 6 |
| man from the man | Hunry Dw | divi s | * 000 | lava. | trada |
| I de la company | 10 4. | and i - Ox | 10 V | man. | + parlow |
| Tarlando III | Carried Tox | (in a contract of | mill great | Lake L | An - |

| | LLG1 |
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| | Chapter 12 - Practice Set |
| 1 | Create three classes Calculator, Sc Calculator and Hybrid Calculator and group them into a package. |
| 2 | Use a built-in package in Java to write a class which displays a message (by using sort) rafter taking input from the user. |
| 3 | Create a package in class with three package levels folder, folder 1, folder 12 |
| | - Folder 1 - Folder 1 2 |
| 4 / | Prove that you cannot access default property but can access protected property from the subclass. |
| | |
| | |
| | |
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| | |

| | EDGE |
|--------|---|
| | Chapter 13 - Multithreading |
| . 1/ | Multiprocessing and multithreading both are used to acheive multitasking |
| 3.85 | Process 2 Process 3 Thread: |
| | (05) Riocers |
| | In a nut Shell |
| → | Threads use shared memory area. |
| → → | Threads as Faster Content Switching A Thread is light-weight whereas a process is heavyweight |
| | ic heavyweight whereas is process |
| | |
| 1 | For Example - A word processor can have one thread |
| | running in foreground as an editor |
| 2 | For Example > A word processor can have one thread running in foreground as an editor and another in the background auto saving the document! |
| | |
| | flow of control in Java |
| 17 | Without threading: |
| | main() -> func(2) -> END |
| | |
| 2, | With threading: |
| | mainco |
| | [funci()] END |
| | [func 2()] |
| | |

| - | | | | |
|-----|--|--|--|--|
| | Creating a Thread | | | |
| | There are turn want a west a will | | | |
| 17 | There are two ways to create a thread in Java. By extending Thread class By implementing Runnable interface | | | |
| 2.7 | By implementing Rymoble interfer | | | |
| | The same in the sa | | | |
| | Life cycle of a Thread | | | |
| | | | | |
| | 1 New] | | | |
| | 1 | | | |
| | 2 Runnable (G) Abon Runnable (G) C Blocked) | | | |
| | (Blocked) | | | |
| | 3 Running | | | |
| | | | | |
| | (5) Terminated | | | |
| | | | | |
| 0 | New -> Instance of thread created which is not yet started | | | |
| | by invoking start () | | | |
| | D 10 A1L : 1: 1 C : 1 | | | |
| (2) | Kunnable -> After invocation of start () & before it is | | | |
| | Runnable -> After invocation of start () & before it is selected to be run by the scheduler. | | | |
| | | | | |
| (3) | Running - After thread scheduler has selected it. | | | |
| | | | | |
| (4) | Non Runnable -> Thread alive, not eligible to run. | | | |
| 0 | Townist 1 , 1941 1 , 2014 1 | | | |
| (5) | Terminated -> runc) method has exitted | | | |
| | The Thread alone | | | |
| | The Thread class Below are the commonly used Constructors of Thread class: | | | |
| ~ | The In | | | |
| | Thread (String name) G Thread (Runnable r, String name) | | | |
| 3 | Thread (String name) G Thread (Runnable r, String name) Thread (Runnable r) | | | |
| (3) | Inclose (Turmance r) | | | |

| lava: | Methods of Thread class Thread class offers a lot of methods Such as runc), Starte, joine, get Priority, Set Priority), et. More can be found on visiting Java docs |
|--------|---|
| | life lyde of a Trend |
| | Teval o |
| | (D) Rumable (B) |
| | · (3) Rummal Seises Seises Seises Seises |
| | (3) Terroundtell (4) Alexandra (4) |
| baten | O New - Instance of thereof control which is not yet 5 |
| à | 2 Runnable - After invocation at start of 2 before it is selected to be sum by the scheduler |
| | 3 Running - After threat scheduler has selected it. |
| | (A) Non Rumable & Therat aline, not eligible to rum. |
| | (5) Tempinated -> runch method has exitted |
| : Real | Below are the Commonly used Constructors of Threat |
| | (a) [hread (Spring reme) (b) Thread (Runnoller & Glering reme) |
| | · · · · · · · · · · · · · · · · · · · |

| | EDG3 |
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| | Chapter 13 - Practise Set |
| 1 | Write a program to print good morning and welcome Continuously on the screen in Java Using Threads. |
| 2 | Add a sleep method in welcome thread of grestion 1 to dealay its execution for 200 ms. |
| 3 | Demonstrate get Priority () and Set Priority () methods in Java Threads. |
| 4 = | How do you get state of a given thread in Java? |
| 5 | How do you get reference to the current thread in Java? |
| | |
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| | Chapter 14 - Errors & Exceptions |
|----------|---|
| 1, | |
| 10 Llan | No matter how smart we are, errors are our constant companions. With practice, we keep getting better at finding & correcting them. |
| | at Goding I controlling them |
| | yelling better all finding to covering men. |
| with the | There are three types of errors in Java. Syntax errors |
| 17 | Syntax errors |
| 27 | Logical errors |
| 37 | Logical errors Runtime errors -> Also called Exceptions! |
| | |
| | Syntax Errors |
| - 17 | When compiler finds something wrong with our program, |
| | Syntax Errors When compiler finds something wrong with our program. It throws a syntax resor. |
| Aberry | |
| | int a = 9 	No semirolon, syntax error! a = a+3; |
| | |
| | d = 4; -> Variable not declared, Syntax error! |
| | - was in succession, symmetry |
| | Logical errors |
| | A logical error or a bug occurs when a program |
| | A logical error or a bug occurs when a brogram compiles and runs but does the wrong thing. |
| | 100010000 110 1 |
| 7 | musage delivered wrongly |
| | income time of Chats being displayed |
| 7 | message delivered wrongly wrongly time of chats being displayed incorrect reducets! |
| | Runtime Exposs |
| | Java may sometimes except |
| | brogram is running. There on error while the |
| | Runtime Extors Java may sometimes encounter an error while the frogram is running. These are also called exceptions! |
| | |

| | Truse are encountered due to circumstances like |
|----|--|
| | bad input and (or) resource constraints. |
| | Ex: user supplies '5' + 8 to a program which |
| | adds 2 numbers. |
| | E with |
| | Syntax errors and logical errors are encountered |
| | by the programmer where as Runtime errors are encountered by the users. |
| in | are encountered by the users. |
| | and find of the state of the st |
| | Exceptions in Java |
| | An Exception is an event that occurs when a program |
| | is executed disrupting the normal flow of instructions. |
| | There are mainly two types of exceptions in Java: |
| 17 | Checked Exception - Compile time exceptions (Mandled by Compiler) |
| 27 | An Exception is an event that occurs when a program is executed disrupting the normal flow of instructions. There are mainly two types of exceptions in Java: Checked Exception -> Compile time exceptions (Mandled by Compiler) Unchecked Exception -> Runtime exceptions |
| | |
| | Commonly Occurring Exceptions |
| | Following are few commonly occurring exceptions in Java: |
| 17 | Null Pointer Exception |
| 27 | |
| 3, | |
| 4) | Hegal Argument Exception |
| 51 | Number format Exception |
| | 66 2 140 |
| | try-catch black in Java |
| | In Java, exceptions are managed using try-catch blocks |
| 24 | Syntax: |
| | fry 5 |
| | 11 Lode to try 3 |
| | catch (Exception e) { |
| | 11 Code if exception |
| | 3 |
| | |

Handling specific Exceptions
In Java, we can handle specific exceptions by typing
multiple catch blocks. 1/Code Catch [IoException e] Catch (Arithmetic Exception e) & - Handles all Exceptions of
Wode Arithmetic Exception Catch (Exception e) { - Handles all other Exceptions Nesked try-catch
We can nest multiple try-catch blocks as follows: (atch (Ex. c) { Hested try- atch blocks Similarly, we can further nest try catch blocks inside the nested try catch blocks.

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| | Quick Quiz: Write a lava program that allows you to |
|-------|--|
| net. | Rest accessing an array until a |
| 4, | Volid index is own hu the use |
| A | Quick Quiz: Write a Java program that allows you to keep accessing an array until a Valid index is given by the user. |
| 3,0 | The state of the s |
| | Tolo Con with our and [11] |
| 7 | Exception class in Java We can write our custom Exceptions using Exception class in Java: |
| \$ 0 | M Java . There I say I say alaborat trov sibiling |
| | 111: 1 11 5 6 |
| | public class My Exception extends Exception { No verridden methods |
| | No verriddin methods |
| | Jona finally block - & |
| MAN P | Singly block contains the costs which is always |
| | The Exception class has following important methods: |
| 13 | ALL CLEAR THE CHARLEST WILL CAN THE LANGE THE THEORY THE CAN T |
| (1) | String to String () -> executed when sout (e) is van |
| (2) | Void brint Stack Trace() -> brints stack trace |
| (3) | String to String () -> executed when sout (e) is van Void print Stack Trace () -> prints Stack trace String get Message () -> prints the Exception message |
| | |
| | The throw Remisord |
| | The throw keyword is used to throw an exception explicitly by the programmer |
| | explicitly by the programmer |
| | vapacity by the programmer |
| | 11/10) 5 |
| | if (b==0) { throw new Arithmetic Exception ("Div by 0"); |
| | Throw new Arithmetic Exception [Div by 0); |
| | 3 |
| | else { |
| | return a/b; |
| | 3 |
| | |
| | In a similar manner, we can throw user defined exceptions: throw new My Exception ("Exception thrown"); |
| | exceptions: |
| | through near My Exception (" Exception thrown"); |
| | The state of the s |

The throws exception

The Java throws keyword is used to declare an taution.

This gives an information to the programmer that there might be an exception so its better to be parepared with a try which block! public Void Calculate (int a, int b) throws 10 Exception { Java finally block finally block contains the code which is always execute whether the exception is handled or not.

It is used to execute code containing instructions to release the system resources, close a connection etc.

| | EDGE EDGE |
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| | Chapter 14- Practice Set |
| | |
| 1 | Write a Lova program to demonstrate syntax, logical 8 runtime errors. |
| 1 | 8 runtime errors. |
| | |
| 2 | Write a Java program that prints "Haffa" during Arithmetic exception and "Heffe" during an Illegal argument exception |
| 1 | Arithmetic exception and "HeHe" during an Illegal |
| | argument exception |
| | |
| 3 | Write a program that allows you to keep accessing an array until a valid index is given. If max retries exceed 5 prind "Error". |
| | an surray until a valid index is given. If max |
| | retries exceed 5 prind "Error" |
| | |
| 4 | Modify program in Q3 to throw a scustom Exception if max retries are reached. |
| 4 | if max retries are reached. |
| | |
| 5 | Wrap the program in Q3 inside a method which throws your custom Exception. |
| | throws your custom Exception. |
| | |
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| | Advanced Java - 1 |
|---------------|---|
| | |
| 1000 | Collections Framework |
| | A collection represents a group of object. Java collections provide Classes and Interfaces for us to be able to write code quickly and |
| | Java Collections provide Classes and Interfaces |
| <u> (%)</u> | for us to be able to write code quickly and |
| Jasi | efficiently |
| | Asamest facetion |
| | Why do we need Collections |
| 0.0 N | We need Collections for efficient storage and |
| X,6,K | We need Collections for efficient storage and better manipulation of data in Java- For ex: We use arrays to store integers but |
| | for ex: We use arrays to store integers but |
| | what if we want to |
| \rightarrow | Kesize This array? |
| \rightarrow | Insert an element in between? |
| → | Delete an element in Array? |
| → | Apply certain operations to change |
| | this array? |
| | Harris and the second of the |
| | Now are collections available |
| | Collections in Java are available as Classes and Interfaces. Following she few commonly used Collections in Java: |
| | (11. 1: 1. Tollowing will few nommonly used |
| | Collections in Java. |
| * | Arraulist - In variable Line Collection |
| * | Arraylist -> For variable Size Collection Set -> For distinct collection Stack -> A LIFO data structure |
| * | Stock - A 11FO data structure |
| * | HashMap > For Storing key-value pairs |
| T | |
| | Collection class is available in java-util package Collection class also provides static methods for Sorting, searching etc. |
| | Collection class also provides static methods for |
| | Sorting Serreting etc. |
| | |