The table below contains content to understand the basics of Java, OOP, and Advanced Java. Notes for the content are also shared. If any notes are missed, please include them in the suggestions document.

• **INTRODUCTION TO JAVA** • **JAVA ORIGIN, APPLICATIONS, ADVANTAGES, AND WORKING (COMPILE & RUNTIME)** • **PLATFORM INDEPENDENCE VS PLATFORM DEPENDENCE** • **STATIC VS DYNAMIC LANGUAGE** • **COMPONENTS OF JAVA (JDK, JRE, JVM, JIT)**
• **MEMORY MANAGEMENT -> RAM VS ROM** • **EXPLANATION OF VARIABLES WITH THEIR NAMING CONVENTION** • **DATA TYPES -> PRIMITIVE AND OBJECT/USER-DEFINED** • **NUMBER REPRESENTATION -> DECIMAL, OCTAL, HEXADECIMAL & BINARY** • **JAVA STACK AND HEAP MEMORY**
• **TYPE-CASTING (PRIMITIVE)** • **INPUT IN JAVA -> SCANNER CLASS** • **OUTPUT IN JAVA -> SYSTEM CLASS** **-> DIFFERENT TYPES OF PRINTING (SYSTEM.OUT.PRINT/PRINTLN/PRINTF)** • **PLACEHOLDERS/FORMAT SPECIFIERS IN JAVA** • **TEXT BLOCKS** • **ESCAPE CHARACTERS**
• **BINARY STRUCTURE OF FLOAT AND DOUBLE** • **FLOAT/DOUBLE -> BINARY (CONVERSION)** • **BINARY -> FLOAT/DOUBLE (REVERSE CONVERSION)**

- **SPECIAL CASES -> NEGATIVE NUMBERS, INDEFINITE MANTISSA, AND NUMBERS STARTING WITH 0.XX**
- **COMPARING FLOAT AND DOUBLE - WHY ARE THEY NOT EQUAL**

- **OPERATORS IN JAVA**

- **SIGNED VS. UNSIGNED**
- **SHIFTING OPERATOR AND TYPES**
- **SCOPING IN JAVA**

- **DECISION-MAKING STATEMENT**

-> SIMPLE IF, IF ELSE, IF-ELSE-IF LADDER, NESTED IF, SWITCH

- **LOOPING STATEMENT (3 THINGS TO SET UP - LOOP VARIABLE INITIALISATION, UPDATE AND TERMINATION CONDITION)**

-> WHILE VS DO WHILE LOOP

-> FOR-RANGE & FOR-EACH LOOP

- **CONTROL STATEMENT**

-> BREAK & CONTINUE

-> LABELLED BREAK & LABELLED CONTINUE

- **INTRO TO STRING CLASS**

-> STRING CONSTANT POOL [SCP], IMMUTABILITY NATURE, SPACE OPTIMISATION, COMPARISON BETWEEN == AND .EQUALS() METHOD

- **OVERVIEW OF TYPE CASTING**
- **STRING BUILT – IN METHODS**
- **COMPACT STRINGS - JAVA 9**
- **STRING TEMPLATES - JAVA 21**

- **INTRO TO ARRAY DS & PROPERTIES**

  -> CONTIGUOUS MEMORY ALLOCATION

  -> HOMOGENEOUS COLLECTION OF DATA

  -> INDEXING THE ARRAY

- **ARRAY BUILT-IN METHODS**

- **JAGGED ARRAY**

- **INTRODUCTION TO OOPS -> CLASS & OBJECT**

- **VARIABLES -> INSTANCE, STATIC & LOCAL**

- **METHODS (METHOD SIGNATURE/HEADER, METHOD BODY & METHOD CALLER)**

  -> BASED ON STRUCTURE (4 TYPES)

  -> WITH/WITHOUT ARG & WITH/WITHOUT RETURN TYPE

  -> BASED ON OOPS (2 TYPES)

  -> INSTANCE & STATIC

-> METHOD VS FUNCTION

-> ARGUMENT VS PARAMETER

- **CONSTRUCTOR -> USAGE & TYPES -> NO-ARGS, PARAMETERISED & DEFAULT, COPY**

- **BLOCKS -> USAGE & TYPES -> INSTANCE INITIALIZER AND STATIC INITIALIZER**

- **DIFFERENCE IN WORKING OF CALL BY VALUE & REFERENCE IN C & JAVA**

- **COMMAND LINE AND VARIABLE-LENGTH ARGUMENT**

- **ENUMERATIONS**

- **INTRO TO PILLARS OF OOPS -> INHERITANCE**

-> SIMPLE, MULTI-LEVEL, HIERARCHICAL, HYBRID, MULTIPLE

- **-> AMBIGUITY ISSUE WITH MULTIPLE INHERITANCE**

- **THIS KEYWORD -> NAMING CONFLICT ISSUE & INVOKING CURRENT CLASS VARIABLE, CONSTRUCTOR, METHOD**

- **SUPER KEYWORD -> INVOKING PARENT CLASS VARIABLE, CONSTRUCTOR, METHOD**
- **FLEXIBLE CONSTRUCTOR BODIES – JAVA 23**
- **CONSTRUCTOR CHAINING -> WITHIN CLASS (THIS KEYWORD) & ACROSS CLASS (SUPER KEYWORD)**
- **FINAL KEYWORD -> CLASS, METHOD, AND VARIABLE**
- **POLYMORPHISM -> COMPILE-TIME (METHOD OVERLOADING) AND RUN-TIME (METHOD OVERRIDING)**
- **COVARIANT RETURN TYPE IN METHOD OVERRIDING**

- **ABSTRACTION -> ABSTRACT CLASS & INTERFACE**
- **MULTIPLE INHERITANCE IMPLEMENTATION USING INTERFACE**
- **FUNCTIONAL INTERFACE & DEFAULT METHODS (JAVA 8 FEATURES)**
- **DIFFERENT WAYS OF IMPLEMENTING THE INTERFACE**
  -> CLASS IMPLEMENTATION

-> ANONYMOUS INNER CLASS IMPLEMENTATION

  -> LAMBDA EXPRESSION (ONLY FOR FUNCTIONAL INTERFACE)

- **ENCAPSULATION -> DATA HIDING [GETTER AND SETTER METHODS]**
- **STATIC METHOD OVERLOADING & HIDING**

-> MAIN METHOD OVERLOADING

- **FRIEND CLASS / METHOD & VIRTUAL KEYWORD IN C++**
  -> EQUIVALENT IMPLEMENTATION IN JAVA
- **SEALED CLASS / INTERFACE**
  -> DIFFERENT WAYS OF IMPLEMENTATION
- **CLASS UP AND DOWN CASTING**

- **OTHER PILLARS OF OOPS**
  -> ASSOCIATION, AGGREGATION, COMPOSITION, COUPLING & COHESION

- **UML RELATIONSHIPS**

  -> GENERALIZATION, SPECIALIZATION, DEPENDENCY & REALIZATION

- **PACKAGES -> DEFINING & IMPORTING**
- **ACCESS SPECIFIER -> PUBLIC, PRIVATE, PROTECTED & DEFAULT**
- **CLASS DIAGRAM COMPONENTS**
- **STATIC IMPORT IN JAVA - ADVANTAGE & DRAWBACK**

- **JAVA SINGLE FILE EXECUTION - JAVA 11**
- **UNNAMED IMPLICIT CLASS & INSTANCE MAIN METHOD - JAVA 21**

- **WRAPPER CLASS**

  -> AUTO-BOXING & UN-BOXING

  -> BUILT-IN METHODS

- **EXPLANATION OF THE OVERALL STRUCTURE OF THE COLLECTION FRAMEWORK**
- **DIFFERENCE BETWEEN ARRAY & ARRAYLIST**
- **MANAGING GROUPS OF OBJECTS USING COLLECTIONS AND ARRAYS**
- **BEHAVIOR OF DIFFERENT COLLECTIONS**
- **SEQUENCED COLLECTION INTERFACE**

  -> UNIFIED INTERFACE FOR ADDING / GETTING / REMOVING ELEMENTS FROM FIRST & LAST, REVERSED METHOD

- **VAR IN JAVA**
- **GENERICS IN JAVA**

  -> COMMON TYPE PARAMETERS

  -> TYPE ERASURE

  -> BOUNDED (LOWER AND UPPER) & UNBOUNDED TYPE DECLARATION

- **SORTING THE COLLECTIONS**

-> COMPARABLE INTERFACE (NATURAL WAY OF SORTING)

-> COMPARATOR INTERFACE (CUSTOM WAY OF SORTING)

- **DIFFERENCE BETWEEN COMPARATOR & COMPARABLE**
- **ENHANCEMENTS IN COMPARATOR**
  -> UTILITY METHODS VS. MANUAL IMPLEMENTATION
  -> COMPARATOR CONSTANTS - BUILT-IN & CUSTOM

- **INSTANCE-OF OPERATOR -> ENHANCED VERSION**
- **RECORD KEYWORD IN JAVA**
- **ALL ABOUT SWITCH**

→ ENHANCED SWITCH - YIELD, COMBINING MULTIPLE CASES, NO-FALL THROUGH

→ ALLOWING STRING, NULL VALUES

→ PATTERN MATCHING (WITH INSTANCE-OF OPERATOR)

→ RECORD DECONSTRUCTION

-> PRIMITIVE PATTERN MATCHING IN SWITCH – JAVA 23

- **DIFF BETWEEN ERROR & EXCEPTION**
- **EXCEPTION -> CHECKED [COMPILE TIME] & UNCHECKED [RUN TIME]**
- **EXCEPTION HANDLING**
  -> TRY CATCH BLOCK
  -> MULTIPLE CATCH BLOCKS / MULTI CATCH
- **FINALLY BLOCK -> RESOURCE CLEANUP**
- **TRY WITH RESOURCE BLOCK -> JAVA 8**

- **WORKING OF THROW & THROWS KEYWORD**
- **EXCEPTION PROPAGATION USING THE THROWS KEYWORD**
- **CUSTOM EXCEPTIONS**
- **SUPPRESSED EXCEPTIONS USING TRY WITH RESOURCE BLOCK**

- **INTRO TO FILE CLASS & BUILT-IN METHODS**
- **INTERNAL WORKING OF FILE READER & BUFFERED READER**
- **ENCODING AND DECODING CHARACTERS USING UTF-8**
  - UTF-8 BIT PATTERN
  - ENCODING = CHAR-> UNICODE -> BINARY -> PATTERN MATCHING -> HEX BYTE
  - DECODING = BYTE STREAM -> BINARY -> PATTERN MATCHING -> PREFIX REMOVAL -> UNICODE (HEX)
  - SPECIAL CASE (SURROGATE PAIR CALC) IF DECODED UNICODE IS 4 BYTES
- **INTERNAL WORKING OF FILE WRITER & BUFFERED WRITER**
- **INTRO TO SERIALISATION & DESERIALISATION**
- **WORKING OF OBJECT INPUT/OUTPUT STREAM**
- **SERIAL VERSION ID -> IMPORTANCE & USAGE**
- **TRANSIENT KEYWORD**

- **NIO PACKAGE**

-> FILES & PATH METHODS
-> LOW LEVEL (CHANNEL AND BUFFER USAGE) & HIGH LEVEL (FILES METHOD) - FOR READING AND WRITING INTO THE FILE
-> MEMORY MAPPED BUFFER & OFF - HEAP MEMORY
-> RANDOM ACCESS FILE WITH BYTE BUFFER

- **INTRO TO STREAM API - JAVA 8**
- **PROPERTIES OF A STREAM**
  -> CONSUMABLE IN NATURE
  -> INTERMEDIATE (LAZY) / TERMINAL (EAGER) OPERATION
- **INTERNAL WORKING OF THE STREAM**
  -> REFERENCE PIPELINE
  -> SINK CHAIN & EVALUATE METHOD
- **DIFFERENT METHODS OF STREAM**

- **FUNCTIONAL INTERFACES USED IN STREAM**
- **GATHERERS IN STREAM WITH ITS FACTORY & CUSTOM METHODS – JAVA 23**
- **OPTIONAL CLASS**

- **INTRO TO GARBAGE COLLECTION**
  -> MEMORY LEAKS & OUT OF MEMORY ERROR

-> GENERATIONAL GARBAGE COLLECTION LIFECYCLE
-> YOUNGER GENERATION - EDEN, SURVIVOR SPACE (S0/S1) SPACE
-> MINOR GC - COPYING ALGO
-> OLDER GENERATION - TENURED SPACE
-> MAJOR GC - MARK - SWEEP - COMPACT ALGO
-> TYPES OF GARBAGE COLLECTORS

- **TYPES OF REFERENCES**
- **FINALIZE METHOD IN JAVA**

- **INTRO TO JAVA REGEX**
  -> PATTERN & MATCHER CLASS
  -> LITERALS, META CHARACTERS, CHARACTER CLASSES, QUANTIFIERS, GROUPS, ANCHORS

- **LOGGING FLOW AND CONFIGURATION PROPERTIES FILE**
- **LOGGING HANDLERS - CONSOLE, FILE**
- **LOGGING FORMATTERS**
  -> SIMPLE AND XML
  -> CUSTOM - JSON, COLOR & CSV
- **LOGGING LEVELS**
- **LOGGING METHODS**
- **XPATH - XML ANALYSIS**

- **JAVA COMMANDS**

  -> JAVADOC, JAR, JSHELL, JCONSOLE, JAVAC, JAVAP, JAVA & OTHERS

- **REFLECTION API - INSPECTING THE CLASSES IN RUNTIME**