

# Proficiencies and Research

This document aims to provide a broad summary of my proficiencies and general areas of research and within Java, Kotlin, Android and cloud technologies.

## Java SE

Top Level	
Class	Abstract Class
Interface	Enum

Nested Types	
Types	Local Class Inner Class Static Nested Class Anonymous Class Lambda Expressions Method Reference
Members	Permitted Members Access to Outer Scopes Shadowing Final or Effective Final
Nesting Principles	Memory Depiction Instantiation From External Scopes

Static Nested Class	
Effective Top Level Class	Internal Memory Depiction
Permitted Access to Outer Scopes	Instantiation From External Scopes

Anonymous Class	
Header / Body Syntax	Anonymous Object
Extended Class	Inline Implementation
Access to Outer Scopes	

Lambda Expression	
Purpose / Intended Use	Functional Interface
Parameters / Body Syntax	Zero Parameters Multiple Parameters Explicit Parameters Implicit Target Type
Access to Outer Scopes	

Enum	
Declaration / Definition	Header / Body Syntax Enum Constants Enum Constructor Memory Composition
Instantiation	Declaration Referencing Restrictions

Blocks	
Permitted Usage	Permitted Members Unpermitted Members
Initialisation Blocks	Initialisation Blocks Labelled Blocks

Class	
Declaration / Definition	Header / Body Syntax Access Modifiers Memory Composition Static Non-Static Overloading Overriding Shadowing Fields Instance Class Constants Constructors Default No Argument Super Constructor Constructor Chaining Initialisation Blocks non-Static Static
Methods	Signature Parameter List Parameter Type [ByValue] Primitive Arrays VarArgs Object Variable Interface Variable Method Ref. Lambda Expression Ambiguity Scope / Access Covariant Return Type
Extending	Compatibility
Interface Implementation	Single Multiple Generic
Instantiation	Declaration Allocation Initialisation Variable Referencing Member Referencing Garbage Collection

Interface	
Declaration / Definition	Header / Body Structure Syntax Memory Composition Implicit Access Modifiers Members Permitted Unpermitted Fields Constants Only Methods Abstract Static Default Extending Multiple Inheritance non-Static Members Aggregation Non-Ambiguity Non-Clashing Consolidation
Class Implementation	Abstract Method Implementation Abstract Method Aggregation No Ambiguity
Interface Variables	Polymorphism Anonymous Objects Compatibility
Types	Normal Functional Semantic Annotation

Arrays	
Declaration / Allocation / Initialisation	Utility Methods Sorting Collection Conversion Searching
Utility Classes	Copying Comparison
System java.util.Arrays	

Annotations	
Declaration	Types Annotation [Predefined] Annotation Type [Custom] Container Annotation Type Meta-Annotations Type Annotation
Elements	
Deployment	Single Multiple / Repeated

Static / non-Static Memory

Component	Static Memory	non-Static Memory
Memory Composition	Permitted Members	Permitted Members
Memory Depiction	Static Member Initialisation	Permitted Referencing
Memory Depiction within nested components	Static Member Default Values	Default Values
Memory Scope	Static Member Referencing	Nested Components
Memory Properties	Permitted Referencing	Nested Referencing
Internal Composition	Nested Components	Outer Scope Referencing
Location	Nested Referencing	Shadowing
	Outer Scope Referencing	
	Shadowing	

Exceptions

Checked / unchecked	try-catch-finally	Laziness
Chained exceptions	try-with-resources	Interference
Catch / specify requirement	RuntimeException	Aggregate Operators v Iterators
Throwable	Error	Collection Traversal
Exception		Low Level Operation
		Side Effects

Pipelines / Streams

Aggregate Operations:	
Source	
Intermediate Operations	
Terminal / Reduction Operations	
Ordering	

Generics

Application	Generic Interface
Class	Declaration
Interface	Header / Body Syntax
Constructor	Interface Type Parameters
Method	Local Type Parameters
	Extension and Type Pass Up
	Aggregation, Override and Overload
	Multiple Inheritance
	Generic / Non-Generic Inheritance
	Non-Ambiguity
	Interface Consolidation
	Multiple Inheritance / Extension / Implementation

## Techniques and Data Structures

## Dynamic Programming

1D  
2D  
Top-Down  
Bottom-Up / Tabulation

Divide and Conquer  
Greedy  
Backtracking  
Path / Level Tracking  
Sliding / Dynamic Window  
Binary Search  
Big O (Time / Space)

Linked List  
Stack  
Queue  
Deque  
Heap

Min Heap  
Max Heap  
Priority Queue

## Recursion

Recursive Method Structure  
Preprocessing  
Postprocessing  
Base / Ongoing Case  
Call Tree  
Tail Recursion

Hash Table / Map  
Prefix Array  
Suffix Array  
Disjoint Set / Union Find

## Graphs / Trees

Binary Tree  
Binary Search Tree  
Balanced Binary Search Tree  
Minimum Spanning Tree  
n-ary Tree  
Trie

## Graph / Tree Traversal

Directed      BFS / DFS  
Undirected      preOrder  
Acyclic      inOrder  
Edge List      postOrder  
Adjacency List

## Multithreading / Concurrency

## Interface

Runnable  
Callable  
Future  
Lock  
Condition  
ExecutorService  
    ThreadPoolExecutor  
    FixedThreadPool  
ScheduledExecutorService  
    ScheduledThreadPool  
BlockingQueue<E>  
ConcurrentMap<K,V>

## Class

Thread  
ReentrantLocks  
Semaphore  
Executors  
CountDownLatch  
CyclicBarrier  
AtomicInteger  
ConcurrentHashMap<K,V>  
Exchanger<V>  
PriorityBlockingQueue<E>  
PriorityBlockingQueue<E> with Comparable Element

## Fork / Join

Class  
ForkJoinPool  
RecursiveAction  
RecursiveTask<V>  
Sequential v Parallel (via Fork / Join)

## Serial v Parallel

Mergesort  
Find Sum  
Streams

## States

Livelock  
Deadlock

## Techniques

Synchronisation Blocks  
Wait / Notify  
Volatile Memory  
Object Locks  
Object Locks with Conditions  
Producer / Consumer

## Packages

Management / Organisation  
Naming Conventions  
Referencing

Importing Static Members  
Import Wildcards  
Importing Top Level Components

## SOLID Principles

Single Responsibility  
Open-Closed  
Liskov Substitution  
Interface Segregation  
Dependency Inversion

## Infrastructure

JDK  
    SE: Standard Edition  
    EE: Enterprise Edition  
    ME: Micro Edition  
JRE / JVM  
    JIT Compiler  
        CLASSPATH  
        Source Directory  
        Java API Library  
Class Loaders  
    Bootstrap  
    Extension  
    System / Application  
Memory Allocation  
    Heap  
    Stack  
    Program Counter

## Miscellaneous

final      instanceof  
null      .equals()  
super      .hashCode()  
this  
Constructor Chaining  
Local Reference  
Method Argument / Return  
Statements / Expressions / Blocks  
Composition      Hierachy  
Types      Concatenation  
Composition v Aggregation

## Spring

## Projects

Spring Boot      Spring Batch / Integration  
Spring MVC      Spring Security  
Spring Validation      Spring Security For OAuth  
Spring Data      Spring Security Authorisation Server

## Bean Declaration / Definition

via XML  
via Annotation  
via Bean Method (@Bean)  
via Component Scanning (@Component)  
via Configuration Classes (@Configuration)

## Dependency / Bean Injection

via Constructor  
via Setter  
via Field  
via Autowiring

## Spring Initializr

Project Creation / Structure  
    Source Code      Manifest File  
    Resources      Executable \*.jar / \*.war  
    Test      Mavern / Gradle Build  
    application.properties  
    application.yml  
Starter Dependency Selection

## Spring Tool Suite

IDE Plugin  
Spring Boot Dashboard

## Configuration

DSL Configuration  
Configuration Properties  
Profiles

<b>Spring MVC Web Application / REST Endpoint</b> Embedded Tomcat Server Thymeleaf Templates		<b>Lombok</b> @Data (Data Class) Getter / Setter Auto Populate	
@Controller @RestController @RequestMapping @GetMapping @PostMapping @PutMapping  RestTemplate ResponseEntity Object Mapping JSON / XML Payload Pagination Cross Origin Resource Sharing Path Variables HATEOAS		<b>Logging</b> @Slf4j Logback	
<b>Testing</b> @SpringBootTest @WebMvcTest @Test		<b>Persistence</b> Spring Data JDBC/JPA/... JdbcTemplate Schema (via *.sql) SpEL	
<b>Dev Tools</b> Auto Restart Auto Refresh No Caching H2 Console		<b>Security</b> User Authentication Security Filter Chains 3rd Party Authentication OAuth2	
		<b>Messaging</b> Asynchronous Brokers JMS RabbitMQ Kafka Push / Pull Models Message Converters Message Header / Payload Message Listeners	
		@Repository @Table @Data @Id @Query  JWT OpenIDConnect Cross Site Request Forgery Client Repositories	
		JMSTemplate RabbitMQTemplate KafkaTemplate	

## XML HTTP REST

<b>XML</b> Purpose Standards XML Document Prologue Elements Tags Attributes Root Siblings Entity Reference Well Formed Comments Namespaces XMLHttpRequest XML Parser XML DOM XPath XSLT XQuery XLink XPointer DTD / XML Schema		<b>HTTP</b> Purpose Properties Connectionless Media Independent Stateless Versions	
		<b>MIME Type</b> Format Components Type Tree / Subtype Suffix Parameters	
		Registration Trees Standards Tree Vendor / Producer Tree Personal / Vanity Tree Unregistered Tree	
		<b>REST API</b> Purpose Client / Server Stateless Uniform Interface Resource Identification: URI Resource Manipulation: GET, PUT, POST, DELETE... Resource Description: Content-Type: application/json	

## Workflows

<b>Continuous Integration &gt; Continuous Delivery / Deployment</b> Low Risk Progress Automation User Feedback		<b>DevOps</b> Purpose Advantages Pipeline Idea > Code > Build > Deploy > Manage > Learn > Idea... Velocity Quality Value Stream Map	
<b>Test Automation</b> Unit Test Suite Regression Test Suite Performance Test Suite			
<b>Scrum</b> Purpose Team / Roles Product Owner Scrum Master Developers Sprint Events / Workflow Plan Development Review Retrospective		<b>Artifacts</b> Product Goal Product Backlog Increment (of Value) Sprint Backlog Sprint Goal Items Plan of Delivery Burndown Chart	
<b>Maven / Gradle</b> Purpose Project Structure *.pom / build.gradle Modules Dependencies Plugins Maven WAR Maven Cargo Build Lifecycle mvnrepository.com Goals / Tasks		<b>TDD</b> Cycle: Red > Green > Refactor > Red... Unit Tests Solution Space Output Space Constraint Certainty / Flexibility Uncertainty Principle Value / Property Testing Test Doubles Dummy Stub Spy Mock Fake	
		Test Patterns Self Shunt Humble Object	

Language										
History	History				History				History	
Purpose	Purpose				Purpose				Purpose	
Java / JVM Interoperability	Java / JVM Interoperability				Java / JVM Interoperability				Java / JVM Interoperability	
Java Interpretation	Java Interpretation				Java Interpretation				Java Interpretation	
Java Equivalents	Java Equivalents				Java Equivalents				Java Equivalents	
Access Modifiers	Access Modifiers				Access Modifiers				Access Modifiers	
private	private				private				private	
protected	protected				protected				protected	
internal	internal				internal				internal	
public	public				public				public	
Loops	Loops				Loops				Loops	
in	in				in				in	
downTo	downTo				downTo				downTo	
Range	Range				Range				Range	
until	until				until				until	
step	step				step				step	
..	..				..				..	
Types	Types				Types				Types	
Type Inference	Type Inference				Type Inference				Type Inference	
is / as / as?	is / as / as?				is / as / as?				is / as / as?	
.let()	.let()				.let()				.let()	
Type Casting	Type Casting				Type Casting				Type Casting	
Smart Casting	Smart Casting				Smart Casting				Smart Casting	
?	?				?				?	
Unit / Nothing	Unit / Nothing				Unit / Nothing				Unit / Nothing	
val / var	val / var				val / var				val / var	
Any	Any				Any				Any	
Conditionals	Conditionals				Conditionals				Conditionals	
Expressions	Expressions				Expressions				Expressions	
Comparisons	Comparisons				Comparisons				Comparisons	
when	when				when				when	
if-else chain	if-else chain				if-else chain				if-else chain	
Type Checking	Type Checking				Type Checking				Type Checking	
Ranges	Ranges				Ranges				Ranges	
Enum	Enum				Enum				Enum	
Pairs	Pairs				Pairs				Pairs	
Strings	Strings				Strings				Strings	
Templates	Templates				Templates				Templates	
Multiline	Multiline				Multiline				Multiline	
Data Type Conversion	Data Type Conversion				Data Type Conversion				Data Type Conversion	
Concatenation	Concatenation				Concatenation				Concatenation	
Exceptions	Exceptions				Exceptions				Exceptions	
Structure / Form / @Throws	Structure / Form / @Throws				Structure / Form / @Throws				Structure / Form / @Throws	
try catch	try catch				try catch				try catch	
Assignable	Assignable				Assignable				Assignable	
Function Wrappers	Function Wrappers				Function Wrappers				Function Wrappers	
.require()	.require()				.require()				.require()	
Common Library Functions	Common Library Functions				Common Library Functions				Common Library Functions	
.takeIf()	.takeIf()				.takeIf()				.takeIf()	
.takeUnless()	.takeUnless()				.takeUnless()				.takeUnless()	
.repeat()	.repeat()				.repeat()				.repeat()	
.use()	.use()				.use()				.use()	
.with()	.with()				.with()				.with()	
.run()	.run()				.run()				.run()	
.withLock()	.withLock()				.withLock()				.withLock()	
.apply()	.apply()				.apply()				.apply()	
.also()	.also()				.also()				.also()	
Common Annotations	Common Annotations				Common Annotations				Common Annotations	
@JvmName	@JvmName				@JvmName				@JvmName	
@JvmOverloads	@JvmOverloads				@JvmOverloads				@JvmOverloads	
@JvmStatic	@JvmStatic				@JvmStatic				@JvmStatic	
@JvmField	@JvmField				@JvmField				@JvmField	
Nullable / non-Nullable	Nullable / non-Nullable				Nullable / non-Nullable				Nullable / non-Nullable	
Purpose	Purpose				Purpose				Purpose	
Safe Call	Safe Call				Safe Call				Safe Call	
Elvis Operator	Elvis Operator				Elvis Operator				Elvis Operator	
non-Null Assertion !!	non-Null Assertion !!				non-Null Assertion !!				non-Null Assertion !!	
Java / Kotlin Interoperability	Java / Kotlin Interoperability				Java / Kotlin Interoperability				Java / Kotlin Interoperability	
via Annotation	via Annotation				via Annotation				via Annotation	
via Explicit Type Specification	via Explicit Type Specification				via Explicit Type Specification				via Explicit Type Specification	
via Intrinsic Checks	via Intrinsic Checks				via Intrinsic Checks				via Intrinsic Checks	
NPE Safety	NPE Safety				NPE Safety				NPE Safety	
Platform Types	Platform Types				Platform Types				Platform Types	

5

Android Studio					
<b>Project Structure / Files</b>			<b>UI</b>		
Source Code		Gradle	Layout XML	Composable	ConstraintLayout
Resources		Manifest File	LinearLayout	CoordinatorLayout	Constraints
Libraries		APK file	FrameLayout	AppBarLayout	Bias
<b>UI / Layouts</b>		<b>Emulation</b>	ScrollView	CollapsingToolbarLayout	Guidelines
			Padding/Margin	Blueprints	Barriers
			Weighting	Layout Inflation	Chains
	Code Editor	USB Direct	Gravity	Layout Nesting	Flows
	Design Editor	AVD	Themes	Collapsing Toolbar	
<b>Architectures</b>		Intents	AppBar	Scrolling Toolbar	Navigation Bar
		Broadcasts	ToolBar	Material Design	Navigation Drawer
		Services			
MVC	MVI	Work Manager			
MVVM	MPC		<b>Activity</b>		
<b>Views</b>			Lifecycle State / Methods	Save / Restore State	
	TextView	Radio Button/Groups	Lifecycle (Visibility)	Bundle	
	Button	Floating Action Button	Lifecycle (Foreground)	Device Rotation	
	Checkbox	Toast			
	Chip/Groups	Snackbars			
	Spinner	View Groups			
View Binding	Compose		<b>Multiscreen</b>		
View Models	Live Data		Fragments	FragmentManager	
View Model Factories	Mutable Live Data		Fragment Lifecycle	Actions	
View Model Provider	Data Binding		Navigation Component	Safe Args / Directions / Args	
			Navigation Graphs	Back Stack	
			Navigation Host		
			Navigation Controller		

[illegible]

## 6

Kubernetes	
<b>Cluster</b>	
Control Plane	cloud-controller-manager kube-controller-manager kube-apiserver kube-scheduler etcd
Node(s)	kubelet k-proxy Container Runtime Docker Engine CRI-O Containerd Mirantis Container Runtime
Objects	Configuration: *.yaml Pod Deployment Pod Template StatefulSet ReplicaController Volume PersistentVolume PersistentVolumeClaim Secret Service ClusterIP NodePort Load Balancer Ingress
	Label Selector System Environment Variables Role Based Access Control
<b>Cluster Administration:</b>	kubectl kubeadm minikube
<b>Controller(s)</b>	Node Controller Job Controller Endpoints Controller Service Account Controller Token Controller
<b>Cloud Integration</b>	CI / CD Workflow Local > GitHub > Test Suite > DockerHub > Cloud Service Provider Travis CI .travis.yml Cloud Service Provider Configuration Integration Account Verification Environment Variables Logs / Monitoring Declarative / Imperative

## Research Materials

Please find a summary of the primary resource materials used for the research and study of the above subject areas:

### Primary Online Resources

Java SE	Oracle Java Tutorials	<a href="https://docs.oracle.com/javase/tutorial/index.html">https://docs.oracle.com/javase/tutorial/index.html</a>
	Oracle Java API	<a href="https://docs.oracle.com/javase/8/docs/api/index.html">https://docs.oracle.com/javase/8/docs/api/index.html</a>
Kotlin	Online Documentation	<a href="https://kotlinlang.org/docs/home.html">https://kotlinlang.org/docs/home.html</a>
Android	Online Documentation	<a href="https://developer.android.com/">https://developer.android.com/</a>
Spring	Online Documentation	<a href="https://docs.spring.io/spring-framework/docs/current/reference/">https://docs.spring.io/spring-framework/docs/current/reference/</a>
Kubernetes	Online Documentation	<a href="https://kubernetes.io/docs/home/">https://kubernetes.io/docs/home/</a>
Docker	Online Documentation	<a href="https://docs.docker.com/">https://docs.docker.com/</a>

### Udemy Courses

Docker and Kubernetes: The Complete Guide  
 Java Spring Tutorial Masterclass – Spring Framework 5  
 Java Programming Masterclass  
 Design Patterns in Java  
 Concurrency, Multithreading and Parallel Computing in Java  
 Java Memory Management  
 Java Application Performance and Memory Management  
 Java Reflection  
 The Complete Oracle SQL Bootcamp  
 Dynamic Programming and Data Structures  
 Test Driven Development

### Coursera Courses

Kotlin for Java Developers by JetBrains

### Bibliography

Java The Complete Reference	8th Ed.	Herbert Schildt	Oracle Press
Java Cookbook	4th Ed.	Ian F Darwin	O'Reilly
Android Development	3rd Ed.	Dawn and David Griffiths	O'Reilly
Spring in Action	6th Ed.	Craig Walls	Manning
Cloud Native Java	1st Ed.	Josh Long and Kenny Bastani	O'Reilly
Pro Git	2nd Ed.	S.Chacon B.Straub	Apress
Design Patterns	1st Ed.	E.Gamma R.Helm R.Johnson J.Vlissides	Addison Wesley
Clean Architecture	1st Ed.	R.C.Martin	Prentice Hall
Clean Craftsmanship	1st Ed.	R.C.Martin	Prentice Hall
The Clean Coder	1st Ed.	R.C.Martin	Prentice Hall