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12-Week HLS Training Planner — Weeks 1 to 4 with Detailed Sessions, Case Studies & Labs

Week 1: Healthcare Data & Interoperability (Phase 1)

Case Study 1: FHIR-Powered Patient Portal with HL7 Message Parsing

Objective: Demonstrate how HL7 v2.x messages can be parsed and visualized in a patient portal using FHIR.

Case Study 2: CDA-FHIR Hybrid Viewer

Objective: Display CDA documents side-by-side with their equivalent FHIR Bundles in a single UI.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
8th July	Agile Fundamentals and Methodologies	Introduction to Agile	Scrum Framework Deep Dive, Kanban Methodology	**Quiz (20 Qs)** + *Assignment*: Agile/Scrum/Kanban Quiz
9th July	Intro to Healthcare IT, EMRs, and Interoperability Evolution	HL7 v2.x Standard, Message Types (ADT, ORM, ORU)	HL7 Message Structure: Segments, Delimiters, ACKs	**Quiz (20 Qs)** + *Assignment*: Parse, validate & simulate routing of ADT message using 7Edit & Mirth
10th July	FHIR Introduction, RESTful Design Principles	Core FHIR Resources: Patient, Observation, Encounter	Working with Public FHIR Servers via Postman	**Quiz (20 Qs)** + *Assignment*: Perform CRUD operations on Patient & Observation resources

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
11th July	FHIR Profiling with StructureDefinition	Bundles, Composition, DocumentReference, ImagingReports	Terminologies: LOINC, SNOMED, ValueSet, CodeSystem	**Quiz (20 Qs)** + *Assignment*: Create FHIR profile with terminology bindings using Forge/Simplifier
14th July	DICOM Overview, Metadata, PACS/VNA	CDA Structure, CCD Example, USCDI Mandates	Interop Levels, Consent & Provenance Resources	**Quiz (20 Qs)** + *Assignment*: Map sample DICOM to ImagingStudy + create DocumentReference Bundle
15th July	Mirth Connect Setup, HL7 to FHIR Conversion	OAuth2, RBAC, FHIR API Authentication	Simulate EHR-to-HIE to FHIR Workflow	**Quiz (20 Qs)** + *Assignment*: Ingest HL7 → Convert to FHIR → Store in FHIR Server → Access via REST API

Week 2: Software Development Fundamentals (Phase 2)

Case Study 1: BMI Calculator for Geriatric Patients

Objective: Use logic and validations to build a personalized BMI calculator in Python.

Case Study 2: ER Triage Queue Manager

Objective: Simulate a priority-based ER queue using data structures.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
16th July	Intro to SDLC, Variables and Constants (Python/Java)	Data Types, Type Casting, I/O, Arithmetic Operations	Control Flow: if, elif, else, loops	**Quiz (20 Qs)** + *Assignment*: Build a CLI BMI Calculator with validations
17th July	Data Structures: Lists, Stacks, Queues	Hashmaps, Linked Lists, Tree Basics	Searching & Sorting Techniques, Big O	**Quiz (20 Qs)** + *Assignment*: ER Queue simulation using priority + basic DS
18th July	OOP Principles in Healthcare Systems	Inheritance, Overriding, Encapsulation	OOP Case Study: Doctor-Patient-Appointments	**Quiz (20 Qs)** + *Assignment*: Implement mini HMS with OOP model in Python/Java
21st July	Git Basics: init, add, commit, log	GitHub repo setup, branching, merging	Pull Requests, Conflict Resolution, Collaboration	**Quiz (20 Qs)** + *Assignment*: Hospital app feature push + PR merge flow
22nd July	Agile Manifesto, Scrum Roles & Ceremonies	Product & Sprint Backlogs, Jira/Trello	Sprint Simulation, Burndown Charts	**Quiz (20 Qs)** + *Assignment*: Create sprint board with sample healthcare features in Trello

Week 3: Front-End Development (Phase 3)

Case Study 1: Accessible Patient Registration System

Objective: Build an HTML/CSS/JS form with WCAG-compliant validations for elderly users.

Case Study 2: Responsive Healthcare Provider Directory

Objective: Create a responsive provider listing using Grid/Flexbox with filter and display.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
23rd July	HTML5 Structure, DOCTYPE, Meta Tags	Forms: input, select, radio, tables	Semantic HTML for Medical Forms	**Quiz (20 Qs)** + *Assignment*: Multi-page clinic site with patient registration form
24th July	CSS Fundamentals, Box Model, Colors	Flexbox for Layout, Typography	Responsive Design with Media Queries	**Quiz (20 Qs)** + *Assignment*: Responsive styling for Day 1 site with Flexbox and CSS Grid
25th July	JavaScript: Variables, Functions, Events	DOM Manipulation: Forms, Tables	JS Form Validation with Feedback	**Quiz (20 Qs)** + *Assignment*: Interactive appointment form with input validation and confirmation
28th July	WCAG, ADA, Accessibility Tools	ARIA, Screen Reader Support, Keyboard Nav	Empathy in UI for Healthcare	**Quiz (20 Qs)** + *Assignment*: Refactor Day 1 form to WCAG 2.1 using AXE, Lighthouse
29th July	Dashboard Wireframe: Layout Plan	Display Data (Cards, Tables), Navigation	Form Handling + Accessibility	**Quiz (20 Qs)** + *Assignment*: Build patient dashboard UI with

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
				listing + registration form

Week 4: Mobile App Development (Phase 4)

Case Study 1: FHIR Appointment Booking App

Objective: Build a mobile app to fetch and book appointments using FHIR APIs.

Case Study 2: Medication Reminder App

Objective: Create an offline-first cross-platform app with notifications.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
30th July	Native vs Hybrid vs Cross-Platform	Setup React Native & Flutter Envs	Build Hello World + Navigation	**Quiz (20 Qs)** + *Assignment*: Build basic Hello World + nav in RN & Flutter
31st July	Form Inputs, DatePickers, Dropdowns	State Management, Validation Logic	UI Feedback: Toast, Alerts, Focus Mgmt	**Quiz (20 Qs)** + *Assignment*: Build validated patient registration form in both RN and Flutter
1st Aug	REST API, JSON, HTTP/Fetch	Connect to FHIR API (GET, POST)	Offline Storage, Caching, Pagination	**Quiz (20 Qs)** + *Assignment*: Integrate mock FHIR API to fetch/display appointments

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
4th Aug	HTTPS, SSL Pinning, OAuth2, RBAC	Secure Token Storage (AsyncStorage/SP)	HIPAA Mobile Checklist, OWASP	**Quiz (20 Qs)** + *Assignment*: Secure login screen with encrypted token storage
5th Aug	Feature Finalization, Wireframe Design	CRUD for Meds, Schedule, Notify Logic	Testing, Packaging, Review	**Quiz (20 Qs)** + *Assignment*: Final medication reminder app with local storage & accessibility

Week 5: Front-End Development with React (Phase 5 - Part 1)

Case Study 1: Patient Record Viewer

Objective: Build a React-based application to view, search, and update patient records using a FHIR-compliant API.

Case Study 2: FHIR Appointment Dashboard

Objective: Develop a multi-page React app with stateful forms and routing to manage patient appointments.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
6th Aug	Intro to React, Component-based Architecture	Setting up Create React App, JSX Basics	useState, Event Handling, Reusable UI (Card, Button)	**Quiz (20 Qs)** + *Assignment* : Build a patient dashboard UI with reusable

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
				components + form state
7th Aug	React Router Setup and Route Navigation	useParams, useNavigate, Multi-page Structure	Controlled Forms, Custom Validation	**Quiz (20 Qs)** + *Assignment*: Build a patient intake multi-view app with validation and routing
8th Aug	useEffect for API Calls, Fetch/axios Integration	Display FHIR API PatientList, Tables & Filters	Pagination, Error Handling, Secure Token Storage	**Quiz (20 Qs)** + *Assignment*: Connect to mock FHIR API and implement filtered PatientList with pagination
11th Aug	useContext and Global State Management	Create Notification Context, Avoid Prop Drilling	useReducer/useCallback Preview, Performance	**Quiz (20 Qs)** + *Assignment*: Create a shared patient session context and notification logic
12th Aug	Project Planning, UI Component Structuring	Hooking API Calls, Secure Form Editing	Final Review, User Roles, Testing	**Quiz (20 Qs)** + *Assignment*: Build and deploy a mini React patient record app using mock FHIR API

Week 6: Front-End Development with Angular (Phase 5 - Part 2)

Case Study 1: Angular Clinic Dashboard

Objective: Develop a full Angular-based UI for managing patient and appointment data with modular architecture.

Case Study 2: Appointment Manager with Angular Material

Objective: Implement appointment scheduling features using Angular services, routing, and RxJS.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
13th Aug	Angular Intro, CLI Setup, Component Architecture	Template Syntax, Data Binding, Directives	Component Communication with @Input/@Output	**Quiz (20 Qs)** + *Assignment*: Build PatientList and PatientDetail component using Angular CLI
14th Aug	Angular Routing and Navigation	Reactive Forms: Structure and Validation	UI Enhancement using Angular Material	**Quiz (20 Qs)** + *Assignment*: Build and route validated patient registration form to summary view
18th Aug	Angular Services and DI, HTTPClientModule	API Connection to FHIR or Mock Backend	Centralized Data Store using Services	**Quiz (20 Qs)** + *Assignment*: Create PatientService and connect with list/detail views
19th Aug	RxJS Subjects & BehaviorSubjects	State Sharing, Debouncing,	Live Search and NgRx Preview	**Quiz (20 Qs)** + *Assignment*: Implement live search using RxJS

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
		Stream Composition		and central state store
20th Aug	Define UI: Patient List, Appointment Form	Appointment Model, Submission, Auth Guards	Role-Based Access and App Review	**Quiz (20 Qs)** + *Assignment*: Build & deploy Angular appointment app connected to mock FHIR API

Week 7: Backend Development with Java (Spring Boot)

Case Study 1: Secure Patient API with Spring Boot

Objective: Build a Spring Boot API for CRUD operations on patient and appointment data with JWT-based security.

Case Study 2: API Documentation & Deployment

Objective: Add Swagger/OpenAPI documentation and deploy a healthcare API to cloud.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
21st Aug	Spring Boot Setup using Initializr	REST Controllers, Annotations, Embedded Tomcat	Setup H2 + Postman Testing	**Quiz (20 Qs)** + *Assignment*: Spring Boot app with patient GET/POST endpoints
22nd Aug	JPA + MySQL/PostgreSQL Integration	Entity Classes, CRUD Repos,	Exception Handling,	**Quiz (20 Qs)** + *Assignment*: Implement patient

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
		DTOs, Services	Validation, Logging	+ appointment CRUD with error management
25th Aug	REST Design, Endpoint Versioning	Swagger UI + OpenAPI Integration	API Testing, Deployment to Heroku	**Quiz (20 Qs)** + *Assignment*: Document and deploy secure healthcare API with Swagger
26th Aug	Spring Security Overview	JWT Auth Setup, Role-based Access	Token Validation & Secure Filters	**Quiz (20 Qs)** + *Assignment*: Secure API with JWT login and Admin/Doctor roles
28th Aug	Model Design: Doctor, Appointment	CRUD with Validation and Audit Logs	Test API using Postman Suite	**Quiz (20 Qs)** + *Assignment*: Build full Spring Boot REST API with JWT, deploy and test securely

Week 8: Backend Development with Python (Django)

Case Study 1: Django-based Clinic Backend

Objective: Develop backend APIs using Django and Django REST Framework to manage patient and appointment data.

Case Study 2: Online Consultation System

Objective: Implement secure login, role-based API access, and deploy Django backend for healthcare data.

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Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
29th Aug	Django Setup, Project/App Creation	Models: Patient, Appointment, Admin Registration	URLConf, Views, Django Shell	**Quiz (20 Qs)** + *Assignment*: Create Patient model and register in Django Admin
1st Sept	Function vs Class-Based Views	Django Forms, Validation, Error Handling	Bootstrap Integration + Template Inheritance	**Quiz (20 Qs)** + *Assignment*: Intake & appointment forms using Django templates
2nd Sept	DRF Setup: Serializers & ViewSets	API URLs, JSON Response, Filtering	Pagination, Permissions, Versioning	**Quiz (20 Qs)** + *Assignment*: Build API for patient and appointment with DRF
3rd Sept	Token-Based Auth with DRF SimpleJWT	Role-Based Permissions, Swagger Docs	Secure Views + Monitoring	**Quiz (20 Qs)** + *Assignment*: Add JWT auth + generate Swagger docs using drf-yasg
4th Sept	Models: Doctor, Prescription, Consults	Full CRUD API with JWT & Swagger	Deployment on Render or Heroku	**Quiz (20 Qs)** + *Assignment*: Complete a Django REST project for managing medical consults

Week 9: Backend Development with C# (.NET Core)

Case Study 1: .NET Healthcare API for Patient & Appointment

Objective: Build a secure, RESTful .NET Core API managing patient and appointment data using EF Core and JWT authentication.

Case Study 2: Swagger-Based Appointment System for Clinics

Objective: Add OpenAPI docs, versioning, and deploy secure appointment APIs with cloud readiness.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
5th Sept	.NET Core Overview & SDK Setup	Create Web API Project & Controller	DI + Model Design (Patient, Appointment)	**Quiz (20 Qs)** + *Assignment*: Build GET/POST endpoints for patient in .NET Core API
8th Sept	EF Core Config + SQL/PostgreSQL	Entity Classes + Migrations	Async CRUD + Repo Pattern, Logging	**Quiz (20 Qs)** + *Assignment*: Full EF Core CRUD with error handling + validations
9th Sept	REST Design & Routing	Swagger/OpenAPI Docs	Versioning, Paging, FHIR Integration	**Quiz (20 Qs)** + *Assignment*: Add Swagger docs + implement paging/filtering
10th Sept	ASP.NET Identity + JWT Auth	Role-Based Policies + Secure Endpoints	CORS, HTTPS, OWASP Practices	**Quiz (20 Qs)** + *Assignment*: Add JWT-based auth and RBAC on patient API

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
11th Sept	Domain Models + Security Wrap-up	Deploy to Azure App Service	Integration & Review	**Quiz (20 Qs)** + *Assignment*: Capstone - Build & deploy full .NET Core Appointment API securely

Week 10: Database Management & Cloud

Case Study 1: Structured vs Unstructured Healthcare Records

Objective: Design normalized schemas for structured data (PACS, FHIR) and document-oriented NoSQL for EMR, RIS, IDM.

Case Study 2: Serverless Healthcare App on Cloud

Objective: Deploy scalable healthcare backend using serverless APIs, cloud DBs, and CI/CD automation.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
12th Sept	Relational DBs + Postgres/MySQL Setup	SQL Queries & Schema Design	JOINs, Indexing, Backup Strategies	**Quiz (20 Qs)** + *Assignment*: Design patient-visit schema and write SQL queries
15th Sept	Intro to NoSQL (MongoDB Focus)	Document Modeling + CRUD	Aggregations, Indexing, Comparison	**Quiz (20 Qs)** + *Assignment*: Model lab logs in MongoDB + Aggregation queries

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
16th Sept	Cloud Concepts: IaaS/PaaS/SaaS	Setup EC2, Azure App Service	Deploy Sample App, Serverless Intro	**Quiz (20 Qs)** + *Assignment*: Deploy app on EC2/Azure and explore Lambda/Functions
17th sept	Deep Dive into Serverless + CI/CD	Lambda + API Gateway + DB Integration	Logging, Auto-scaling, Monitoring	**Quiz (20 Qs)** + *Assignment*: Build serverless REST API with DynamoDB
18th Sept	High Availability & Security	HIPAA on Cloud, IAM Policies	Final Scalable Cloud Architecture	**Quiz (20 Qs)** + *Assignment*: Deploy healthcare records API with autoscaling, failover monitoring

Week 11: Healthcare Security & Emerging Technologies

Case Study 1: PHI Compliance with GitHub Copilot

Objective: Automate secure coding and auditing logic for HIPAA/GDPR.

Case Study 2: AI-Driven Symptom Classification + Remote Monitoring

Objective: Use AI/ML, secure remote monitoring, and real-time telemedicine tools for modern patient care.

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
19th Sept	HIPAA & GDPR Overview	PHI, PII, Audit	Design Compliance-	**Quiz (20 Qs)** + *Assignment*: Use

Day	Session 1	Session 2	Session 3	Session 4: Assessment + Assignment
		Logging, GitHub Copilot	Ready Software	Copilot to log access and simulate audit for PHI data
22nd Sept	Encryption Techniques (AES, RSA, SHA)	OAuth2, OpenID, RBAC Models	Secure API Design with JWT	**Quiz (20 Qs)** + *Assignment*: Build secure login with RBAC + encrypted storage
23rd Sept	Telemedicine Concepts, IoT Overview	Device Integration + UI Design	Simulate Remote Monitoring, APIs	**Quiz (20 Qs)** + *Assignment*: Build telemedicine UI with mocked vital data stream
24th Sept	AI/ML in Diagnostics, XAI Concepts	scikit-learn Workflow + Model Training	GitHub Copilot for ML Pipelines	**Quiz (20 Qs)** + *Assignment*: Train a symptom classifier using sklearn + deploy with Copilot
25th Sept	Big Data Tools (Hadoop, Spark)	Wearable Ingestion + Realtime Pipeline	Capstone Pipeline with Visualizations	**Quiz (20 Qs)** + *Assignment*: Hadoop/Spark demo + visualizations with security enforced

Week 12: Capstone Project & Final Evaluation

Capstone Theme: Secure, Interoperable Healthcare Management System

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Day	Session 1	Session 2	Session 3	Session 4: Capstone Deliverables
26th Sept	Project Kickoff, Team Setup, Git Repo	Define Architecture: React/.NET/FHIR	Define Compliance Scope (HIPAA/GDPR)	Initialize GitHub repo, Wiki, Agile board with tech stack
29th Sept	Database + Backend Design (Relational & NoSQL)	REST APIs + OAuth2/JWT	Swagger, CI/CD + Security Layers	Deliver Secure API module with Swagger and Unit Tests
30th Sept	Frontend Build: Dashboard + Forms	Integrate APIs, Telemedicine UI	State Mgmt, Deployment, Responsive UI	Build + Deploy Frontend with test coverage (WCAG + HTTPS)
1st Oct	AI/ML Feature: Classifier API	Big Data Stream Ingestion + Charts	Analytics Dashboard + Final Integration	Deploy AI pipeline + integrate with frontend dashboards securely
3rd Oct	Team Demo & Presentation	Evaluation (UI, Security, Interop)	Written + Oral Assessment	Final Capstone App Presentation + Certificate + Career Roadmap