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CURIZENT PROPOSAL FOR FHIR TRAINING

Curizent- Your Partner in Learning HL7 Standards.

Customer: Koenig Solutions client (Abu Dhabi)

HL7® FHIR® ESSENTIALS COURSE

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Executive Summary

Foremost, Curizent thank you for your interest in learning HL7 Standards through our courses. Curizent is committed to provide you best training services that will help participants to understand concepts and prepare them for FHIR certifications and implementation.

This document provides details on “**HL7 FHIR R4 (Fast Health Interoperability Resources)**” Training. R4 is the latest version of FHIR standard and current certification is asked from this version.

Curizent is the organizer for this training. The trainer “Aditya Joshi” has 14 years of experience in HL7 field. He has professional expertise on HL7 Standards. He has given various onsite and online trainings and is associated with ‘HL7 International’. He is working as senior tutor in HL7 Inc. course. A detailed profile of the trainer has been enclosed in this proposal.

Curizent value our relationship with its clients and always strive to give our full commitment in providing the best learning programs to you. This online training is equivalent to at least 7 days of classroom set up. The components of this program include:

- One Trainer for entire training
- Design and customization of the Program
- Soft copy to be available on course platform, students can read anytime and up to any number of times. They would be able to download the same as soft copy material post course completion.
- Activities/Assignments for practical understanding of HL7 FHIR
- Reading FHIR Specification, reading & creating Resources, Bundles, Transactions, profiles etc.
- Post Training Online support to answer queries raised by the Participants

Following are the value-added services from Curizent:

- Online Mock Test
 - The mock test emulates the pattern and content of an actual certification exam with 50 questions to be answered in a duration of 2 hours.
 - This mock test by itself is worth a minimum of USD 100 per participant
- Well organized and structure learning
 - Entire course is divided across 10 chapters and each one consists of reading material, assignments, and live/recorded lectures.
 - In case of online mode of training, it goes for around 6 weeks of duration. Generally, there are 3 live classes per week, each of 2.5 hours in case of online training, this helps participants to learn the concepts gradually and digest them easily.
 - In case of offline (classroom mode), training would be for full day (9 am to 5:30 pm IST). It would need around 7 or 9 days of duration for completing training in classroom mode.
- Course completion certificate
 - Each participant attended and completed the training will be given Curizent course completion certificate

In conclusion, we thank you for requesting our services. Looking forward to seeing you in the training program.

Training Proposal

The training covers all the concepts of HL7 FHIR standard. It prepares you for FHIR implementation work. FHIR is the latest standard by HL7 and based on concept of Resources and works on Rest API. Training will cover all concepts from basics to the most advance ones including profiling, slicing etc. It provides full coverage to certification concepts.

Course Design

There course will have 10 sessions/chapters in total delivered online in a period of 6 weeks through live lectures program or 7/9 days of classroom training. Each session will have one topic covered. The course will start from basic understanding of FHIR and then cover how to read FHIR specification and using it to create Resources, rest api, query, bundles, and advance concepts of profiling/IG.

The course comprises a lot of “hands-on” assignments along with quizzes. Assignments are key in this training and there will be around 5 major assignments which will cover entire practical ground on FHIR.

Target Audience

All staff who wants to be proficient in HL7 FHIR standard. This is especially useful for engineers, Business analysts, and system designers. Clinical SMEs and HL7 integration team dealing with HL7 standards in their project work.

Learning Outcomes

By the end of the course, participants will achieve the following:

- Proficient knowledge of HL7 FHIR standard
- Ability to read and write FHIR Resources.
- Implementation knowledge on:
 - Bundles & Transactions
 - Query & Searching
 - FHIR Paradigms
 - Profiling, Conformance
- Understanding of data types and their use
- Implementation hands on FHIR
- Preparation for FHIR R4 Proficiency Exam

Pre-requisites

- Should have basic knowledge of either XML or Json. Anyone is fine, though JSON is preferable. I will also teach basics of JSON during the live lectures.

Note: training does not include any programming/coding. There will be technical learning but all on FHIR side. All the assignments will be done using public test FHIR servers.

Important Note: This training course is available in various modes- **online (virtual)** classes OR physical **classroom** set up OR **self-paced** mode (pre-recorded lectures).

As the current requirement is for classroom mode, below I am sharing information for that only.

Physical classroom program

Online platform for conducting course	- The course will be hosted on an online E-Learning platform. - Course platform will contain all reading material, quizzes, assignment submission, grading, progress tracking, gamification, discussion forums etc.
Live Lectures	45 hours of live lectures across 10 chapters in a classroom set up.
Duration and structure	- Total duration of the course is roughly 65 hours. - First chapter is provided through recorded lecture, total of 4 hours. Rest all learning happens through live classes. Apart from 50 hours of lectures, rest time participants must invest in completing the assignment. 7 days of duration: in case we go for 8 hours per day classroom interaction 9 days of duration: in case of 6 hours per day of classroom interaction - There will be reading material for each chapter available on platform. Participants would be able to read the material anytime and any number of times. - Participants can download Reading material pdf files in case they want local copy to read or want to print and then read the material. They can utilize this for future revisions also.
Subjective Assignments & tests	- There will be assignments for most of the sessions. - Post online live webinar session, participants can complete assignments in their own time and submit it on the course platform. - Each participant completes his/her assignment independently and submits it course portal. - Each assignment will be graded, and the participant is required to score a minimum of 60% score to complete the course successfully. - Apart from subjective assignments, there will be quizzes, that is, objective assignments.
Mock test	There will be one full length mock test for preparing FHIR R4 Proficiency exam.
Course completion certificate	All successful participants will be awarded course completion certificated issued by Curizent pvt ltd.

Batch size: 20 participants.

It will take **7 full days (8 hours each day) or 9 days (with 6 hours per day classroom) to complete the course in a classroom mode.**

Assignments will be solved during the classroom sessions. Participants will upload them in my course platform. I will review and grade them

Salient Features

- Training includes all the concepts of HL7 FHIR standard and suits anyone having even zero knowledge about FHIR standard
- Complete and comprehensive study material with Practical assignments with each session
- Online support even after completion of training. Participants can mail their queries to related to training or general FHIR issues.
- Covering all concepts for preparing FHIR R4 Proficiency certificate.
- Online mock test to check preparation for actual certification exam. The mock test is worth of Rs. 6000/- per participant if taken independently. This would be part of training program and free for all students taking course.

Trainer Profile

Trainer Name: ADITYA JOSHI

- Bachelor of Computer Science and Engineering
- Certified Educator from HL7 International
- Certified HL7 V2.5/V2.6 Control Specialist
- FHIR R4 Proficiency certified (FHIR certification from HL7.org)
- Member, EAC (Education Advisory Council) at HL7 International
- Chair, Education committee, HL7 India
- Certified Trainer - Senior tutor at HL7 International courses (HL7 Fundamentals, FHIR Fundamentals)
- Implementation experience on FHIR, HL7 V2, V3, CDA (CCDA, CCD), SPL standards

Aditya Joshi has 16 years of experience in various bioinformatics and HL7 projects. He has in-depth knowledge of all HL7 standards. He has worked a lot on HL7 V2 messages and re-designed microbiology susceptibility messages using OBR-OBX grouping concepts. He has also worked for US FDA on SPL (Structured Product Labeling, flavor of HL7 V3 RIM) standard. He has also worked on CDA and CCDA (CCD) documents and their validation. He has done multiple projects on FHIR (STU 3 and R4), helping client to map data to FHIR and creating FHIR APIs.

He is HL7 V2 & FHIR certified and senior faculty at 'HL7 international E-Learning Courses' and as designated tutor from HL7 inc.

He has done his engineering in "Computer Science and Engineering" from M.B.M Engineering College (Jai Narayan Vyas University, Jodhpur, Govt. College).

Specialties: HL7 expert. In depth understanding of US Healthcare. Hands on healthcare data sets and mapping them to all HL7 standards.

HL7 Trainer Profile and experience

- 10+ years of experience in teaching and conducting HL7 standards training.
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- Aditya has trained more than 1000 people on HL7 V2, V3, CDA & FHIR through onsite trainings in last 8 years in India
- Senior Faculty at HL7 International courses. He is working as senior tutor in HL7 E-Learning and other training programs from last 8 years.
- HL7 India Chair, Education Committee
- Onsite trainings for individuals- time to time conduct Face to face training program for individuals across India.
- Onsite Corporate trainings- conducted onsite training at big healthcare IT companies- All Scripts, Scintel, Genpact, UHG (Optum), L&T Technology services, Ricoh, IBM, HCL, CitiusTech, Innovaccer, Wipro, Evolent, Sehati/CHI (Saudi Arabia), Philips, GE Healthcare, TechM, Athenahealth, Symphony Care, Thryvedigital, Collabera, Accolite digital, Google, Entomo etc.
- 150+ participants certified in FHIR (STU3 and R4 both) through my training programs in last two years.
- KSA client- Sehati/council of health insurance – multiple batches of FHIR through physical classroom training on FHIR

Detailed Training Course Outline

1. Session 1: Introduction to FHIR
2. Session 2: FHIR Resource concepts
3. Session 3: CRUD operations (FHIR REST API)
4. Session 4: FHIR Queries/Searching
5. Session 5: FHIR Paradigms: Rest, Messages, Documents
6. Session 6: FHIR Conformance & Profiling
7. Session 7: Representing Healthcare Concepts using FHIR resources
8. Session 8: Implementation Guides- Learning IG using Argonaut profiles
9. Session 9: Overview of SMART on FHIR (Bonus session, only high level and functional overview)
10. Session 10: HL7 FHIR (R4) Proficiency Certificate Exam Review

Session 1: Introduction to FHIR

- ✓ What is FHIR?
- ✓ Why FHIR?
- ✓ FHIR Scope
- ✓ Why FHIR is better- comparison with V2/V3
- ✓ Navigating FHIR site
- ✓ FHIR Architectures
 - FHIR Use cases
 - FHIR and Architectural Principles
 - FHIR Decomposition
 - Organizing FHIR Resources
- ✓ FHIR Overview
 - Background
 - Components
 - Framework
 - Modules
 - Example Resource: Patient
- ✓ What is "the 80 percent"?
- ✓ FHIR Maintenance Process (Change Management and Versioning)
- ✓ FHIR Licensing and IP

Session 2: FHIR Resource Concepts

- ✓ Resources at a glance
- ✓ FHIR Resource concept
- ✓ Representation of the Resources- Structure, UML, XML, JSON
- ✓ Base Resources- Resource & DomainResource
- ✓ Resource Identity and metadata
- ✓ FHIR wire formats- XML & JSON
- ✓ Narrative
- ✓ Datatypes, Abstract data type
- ✓ Resource Referencing
- ✓ Extensibility
- ✓ Terminology Bindings
- ✓ Schema and Schematron
- ✓ Example Use cases- Patient Resource

2.1 Assignment/Hands on Exercise:

- a. Identify correct Resource- Find out correct Resource to be used for multiple scenarios/situations/elements. You will learn how to identify correct and best resource for a given interoperability scenario.
- b. Create your first Resource- build a Patient resource with adding one or two extensions to fulfill client's specific requirement.

Here you will learn how to write Resources based on FHIR Specification and using schema. Also, you will learn how to create or add extensions in Resources.

Session 3: CRUD Operations (FHIR Rest API)

- ✓ RESTful API:
 - API structure and basic concepts
 - Understanding FHIR REST API- various interactions
 - Instance level (read, vread, history, delete, update)
 - Type level (search, create, history)
 - Whole system level (batch/transaction. capabilities, history, search)
 - Various HTTP verbs for success and rejection purpose

- ✓ Learning by example- Manipulating a single FHIR Patient Resource
 - Creating a new resource
 - Reading an existing resource
 - Updating a resource
 - Delete a Resource
 - Reading resources (using resource id, version specific read, history)
 - Conditional Interactions
 - Conditional GET
 - Conditional update - 4 scenarios
 - Conditional Delete – 2 scenarios
 - Create – using If-None-Exist

3.1 Assignment/Hands on Exercise:

- a. Practical exercise to use POST, PUT, GET, DELETE. Create a resource, get it, update and delete it.
- b. Conditional interactions (conditional update, create at least).

You will learn how to play with FHIR server by using Rest api. Creating, updating and fetching resources from server will be the key learning from this unit.

Session 4: FHIR Queries and Searching

- ✓ Concept of FHIR querying
 - Fundamental approach/steps to write any FHIR query
 - Query structure
 - Search parameter & Type
- ✓ Search Parameters
 - Common to all resources
 - Specific to each resource
- ✓ Deep dive learning for all Search parameter types
 - Learning all 9 Search Parameter Types in depth with practical examples for each type
 - Modifiers
 - Prefixes
- ✓ Advance querying
 - Chaining, reverse chaining
 - Include and reverse include
 - Composition

4.1 Assignment/Hands on Exercise:

- a. Retrieve Resources based on multiple search parameters like id, name, telecom etc. Assignments will provide various use cases; you have solved each one by appropriate FHIR queries.

You will learn how to write FHIR queries. Advance querying questions to cover concepts related to include, chaining, reverse chaining, parameters for all Resource etc.

Session 5: FHIR Paradigms: Exchange Mechanisms

- ✓ Bundle resource concepts
 - Learning Bundle usages
 - Traversing through Bundle Resource structure
 - Bundle as Message, Transaction/batch, Document
- ✓ FHIR REST + Transactions
 - Problem – Sending multiple type of data (Patient, observations, conditions or any other resources) in one go using Bundle type Transaction
 - Structure for Bundle as Transaction
 - Rules for Transaction Processing
 - Transaction responses from server
 - Temporary Resource Identification and linking resources within Bundle
 - Practical Examples

5.1 Assignment/Hands on Exercise:

- b. Create a transaction with multiple resources. Client wants to exchange some vital signs information from Device to EMR. Create a transaction and post to EMR server.

This is powerful assignment and will teach you to create Bundle for transaction. Using various resources and linking them inside Bundle. This assignment is very close to what we do on day to day basis in FHIR projects.

Both FHIR Messaging and Documents will be covered high level.

- ✓ FHIR Messaging
 - Messaging Basics, Message events
 - Message Header Resource
 - Constructing Message using Bundle
 - Exchanging Messages
 - Example
- ✓ FHIR Documents
 - Document Structure
 - Composition resource
 - Constructing Document using Bundle
 - Exchanging documents
 - Example

Session 6: FHIR Conformance

- ✓ Need for Profiles
- ✓ Profiling concepts- Constraining the Standard using StructuredDefinition, Slicing, Extension profile.
- ✓ Conformance Resources-
 - CapabilityStatement
 - StructuredDefinition (SD)
 - Operations
 - Parameter Resource
- ✓ Using StructuredDefinition for documenting client requirements
 - Constraining Cardinality
 - Adding client specific rules on data sets allowed in resources
 - Modifying Binding Strength
 - Slicing
 - Adding extensions to Resource SD
- ✓ Profiling – Learning through Examples
 - Creating extension SD
 - Creating ValueSet resource and CodeSystem resource for the extension to contain coded values
 - Adding Binding Strength between extension and ValueSet in SD
 - Modifying Other FHIR Resource StructuredDefinition to refer extension
- ✓ Terminology Module
 - Code System
 - ValueSet
 - Concept Map
 - Terminology Service
 - NamingSystem
- ✓ Using Operations in FHIR
 - What is FHIR operations, how to use them, practical examples
 - Parameters Resource – using Parameters resource for FHIR operations
 - CapabilityResource – understanding capability of the server

Profiling and especially Slicing is bit difficult concept in FHIR. I will explain both in detail with multiple examples. Please note though profiling is advance concept in FHIR, and it is also part of certification.

6.1 ASSIGNMENT/HANDS ON EXERCISE:

- Validate the resource against US core profile- find out issues and rectify them by updating the resource instance and make it valid against one of the US core profiles.

Session 7: FHIR Functional Modules

Representing Healthcare Concepts using FHIR resources: FHIR Functional Modules.

- ✓ **Guide to Resources**
- ✓ **Security**
- ✓ **Security and Privacy Module**
- ✓ **Implementation Support**
- ✓ Foundation
- ✓ Administration
- ✓ Clinical Summary
- ✓ Diagnostic
- ✓ Medications
- ✓ Financial
- ✓ Clinical Reasoning
- ✓ Clinical Safety

This is learning each resource in FHIR and various modules. Important for certification, also enhances knowledge and usage of each FHIR resource. Most part would be self-readable by students in this session.

Session 8: Learning IG Concepts through Argonaut Project

- ✓ Overview of Implementation guides
- ✓ Understanding how IGs are designed using Argonaut project IG
- ✓ One exercise to map some clinical data to Argonaut IG resources

Session 9: Overview of SMART on FHIR

- ✓ 1-hour session on SMART on FHIR (Bonus session, only high level and functional overview)

Session 10: HL7 FHIR (R4) Proficiency Certificate

- ✓ Overview of certificate exam, study guide
- ✓ Enrollment process, fees, how to prepare
- ✓ Details around Mock test.

