



FAST  
HEALTHCARE  
INTEROPERABILITY  
RESOURCES

# FHIR DATA SOLUTIONS

WITH AZURE FHIR SERVER, AZURE API FOR FHIR  
&  
AZURE HEALTH DATA SERVICES

INCLUDES END-TO-END DESIGN  
PHI DATA LAKE FOR EHR, OMICS,  
IMAGING, IOMT, WEARABLES  
& BUSINESS DATA

A COMPLETE GUIDE TO THE HL7 HISTORY- DATA  
STANDARDS - PHI ECHO SYSTEM ANALYSIS WITH  
SOLUTIONS

BY AJIT DASH

# **FHIR DATA SOLUTIONS**

## **WITH AZURE FHIR SERVER, AZURE API FOR FHIR & AZURE HEALTH DATA SERVICES**

**INCLUDES END-TO-END DESIGN  
PHI DATA LAKE FOR EHR, OMICS,  
IMAGING, IOMT, WEARABLES  
& BUSINESS DATA**

**A complete guide to the hl7 history- data standards –  
PHI echo system analysis with solutions**

**BY AJIT DASH**

# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	<b>ii</b>
<b>PREFACE</b> .....	<b>iii</b>
<b>WHOM IS THIS BOOK FOR?</b> .....	<b>vi</b>
<b>CHAPTER 1 INTRODUCTION</b> .....	<b>1</b>
<b>Health Care Industry Revolution &amp; Digitization:</b> .....	<b>2</b>
<b>Health Level Seven International (HL7) Data Standards:</b> .....	<b>3</b>
<b>Challenges with Modern Healthcare Systems</b> .....	<b>4</b>
<b>Government Regulation &amp; Meaning Full Use</b> .....	<b>6</b>
<b>CHAPTER 2</b> .....	<b>7</b>
<b>FHIR STANDARDS</b> .....	<b>7</b>
<b>FHIR Standards &amp; Adoption</b> .....	<b>8</b>
<b>Advantages of FHIR</b> .....	<b>9</b>
<b>Example of a Resources: Patient</b> .....	<b>11</b>
<b>FHIR INFRASTRUCTURE</b> .....	<b>12</b>
<b>FHIR Infrastructure and Services</b> .....	<b>13</b>
<b>FHIR Server for Azure</b> .....	<b>14</b>
<b>Data Lake (PHI) using FHIR Server for Azure &amp; Synapse</b> .....	<b>15</b>
<b>Azure API for FHIR</b> .....	<b>17</b>
<b>Data Lake (PHI) using Azure API for FHIR &amp; Azure Databricks</b> .....	<b>18</b>
<b>CHAPTER 4</b> .....	<b>20</b>
<b>AZURE HEALTH DATA SERVICES (AHDS)</b> .....	<b>20</b>

<b>Azure Health Data Services:</b> .....	<b>21</b>
<b>1. Azure API for FHIR</b> .....	<b>23</b>
<b>2. DICOM (Digital Imaging and Communications in Medicine)</b> .....	<b>23</b>
<b>DICOM Features :</b> .....	<b>24</b>
<b>Application of DICOM:</b> .....	<b>26</b>
<b>Example for the Cohort for Research:</b> .....	<b>30</b>
<b>3. MedTech</b> .....	<b>34</b>
<b>Data Processing in MedTech Real Time Wearable, Ambulance Sensors (Using IoMT)</b> .....	<b>35</b>
<b>Application:</b> .....	<b>37</b>
<b>CHAPTER 5</b> .....	<b>38</b>
<b>PHI DATA LAKE USING AHDS</b> .....	<b>38</b>
<b>PHI Data Lake Using Azure Health Data Services</b> .....	<b>39</b>
<b>PHI Data Lake Data Flow</b> .....	<b>39</b>
<b>PHI Data Lake Data Flow</b> .....	<b>42</b>
<b>PHI Data Lake Reference Architecture</b> .....	<b>43</b>
<b>CHAPTER 6</b> .....	<b>47</b>
<b>CONCLUSION</b> .....	<b>47</b>
<b>Conclusion:</b> .....	<b>48</b>
<b>CHAPTER 7</b> .....	<b>50</b>
<b>FURTHER READING</b> .....	<b>50</b>
<b>Further Reading:</b> .....	<b>51</b>
<b>CHAPTER 9</b> .....	<b>53</b>
<b>ABOUT AUTHOR:</b> .....	<b>53</b>

Welcome to the preface of this book on revolutionizing the health care industry through digitization and the adoption of Health Level Seven International (HL7) data standards, specifically focusing on Fast Healthcare Interoperability Resources (FHIR) and Azure Health Data Services (AHDS). In this book, we will explore the transformative potential of these technologies and their applications in modern healthcare systems.

The health care industry is undergoing a significant revolution driven by digital transformation. The integration of technology and data standards has the power to enhance patient care, improve operational efficiency, and enable better collaboration among health care providers. With the increasing adoption of FHIR and AHDS, health care organizations can unlock the true potential of their data and facilitate interoperability across different systems.

In Chapter 1, we will delve into the introduction, discussing the health care industry revolution, digitization, and the challenges faced by modern health care systems. We will also explore government regulations and the concept of Meaningful Use.

Chapter 2 will focus on FHIR standards, their adoption, and the advantages they offer in promoting interoperability. We will explore an example of a FHIR resource, specifically the Patient resource, to illustrate its practical application.

Moving on to Chapter 3, we will dive into the FHIR infrastructure and services, including the FHIR Server for Azure and Azure API for FHIR. We will also explore how Azure services like Data Lake and Azure Databricks can be leveraged in conjunction with FHIR for managing Protected Health Information (PHI).

Chapter 4 will introduce you to Azure Health Data Services (AHDS), providing an overview of its components such as Azure API for FHIR and DICOM (Digital Imaging and Communications in Medicine). We will explore the features and applications of DICOM and highlight the potential of MedTech in real-time data processing using Internet of Medical Things (IoMT) technologies.

In Chapter 5, we will take a deeper dive into PHI Data Lake using AHDS. We will explore the data flow within the PHI Data Lake and present a reference architecture for building a secure and scalable PHI Data Lake infrastructure.

Finally, Chapter 6 will conclude our exploration, summarizing the key insights and findings. We will also provide references for further reading and a bibliography of the sources used throughout this book.

This book aims to serve professionals and enthusiasts in the health care industry who are eager to explore the potential of FHIR, AHDS, and related technologies. It is designed to provide practical knowledge, insights, and reference materials to empower readers in their digital transformation journey.

I hope you find this book insightful, informative, and valuable in your pursuit of revolutionizing health care through digitization and the adoption of FHIR and AHDS.

Wishing you an enriching reading experience.

Author -Ajit Dash