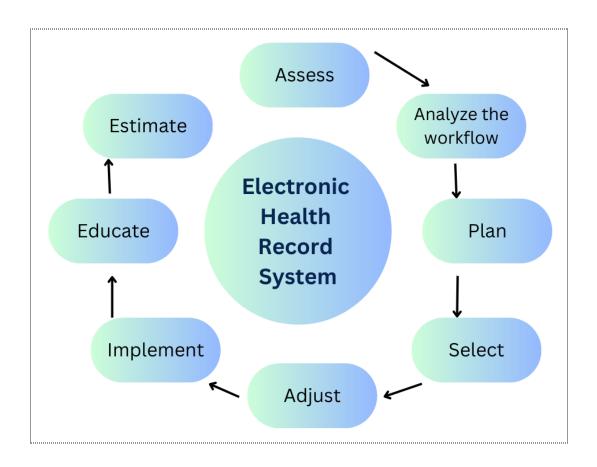
Develop a cloud-based electronic health record (EHR) system using FHIR Azure API

In order to store, exchange, and retrieve patient health data from various healthcare systems and applications securely, this article addresses developing a cloud-based electronic health record (EHR) system utilizing the FHIR Azure API. Fast Healthcare Interoperability Resources also known as FHIR is a healthcare data standard with an application programming interface (API) for representing and exchanging electronic health records. A wide range of FHIR resources, such as patient demographics, prescriptions, test results, treatment plans, and other clinical and administrative data, are supported by the EHR system. It provides customized workflows and alerts to enhance patient care and offer a user-friendly interface for healthcare providers to monitor and manage patient data. To preserve patient privacy and guarantee regulatory compliance, the EHR includes strong security and compliance features.

What is EHR?

An Electronic Health Record digitized representation of a patient's medical history that includes details about their health-related issues, diagnosis, treatments, prescriptions, and lab results. Healthcare practitioners utilize EHRs to manage patient data, communicate with other healthcare professionals engaged in a patient's care, and save patient data.



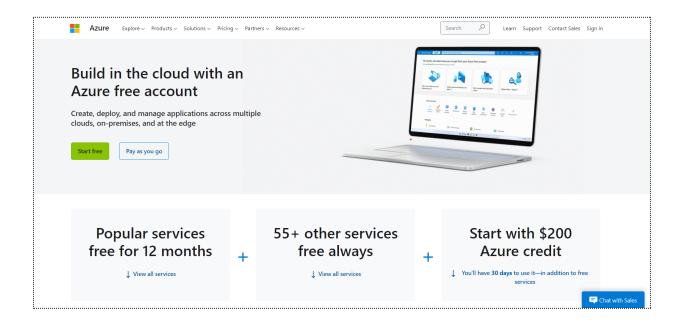
Priority initiative

Electronic health records (EHRs) are a vital component of contemporary healthcare. The purpose of electronic health records is to offer a thorough, accurate, and current record of a patient's medical history, diagnosis and treatment plans. Due to the lack of resources, internet access, and technology, as well as the presence of language difficulties and privacy issues, maintaining medical records in distant locations can be difficult. We require EHRs because of various reasons. Some of them are as follows:

- Scarcity of technology
- Sporadic internet connectivity
- Restricted resources
- Linguistic obstacles
- Privacy concerns

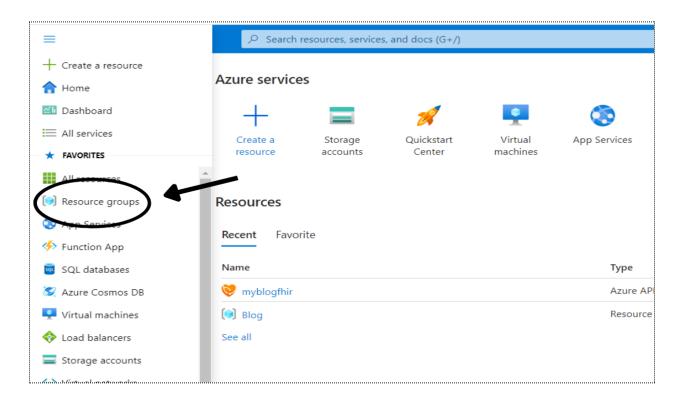
Healthcare Data Management using Azure

1. Create an Azure account: To start using Azure, you first need to create an account. on the Azure website (<u>https://azure.microsoft.com</u>).



2. Set up a resource group: To create a resource group, go to the Azure portal and click on "Resource groups" in the left-hand menu. Click on "Add" and fill in the required details.

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3. Create a storage account: To store patient data, you can create a storage account in Azure. Go to the Azure portal and click on "Storage accounts" in the left-hand menu. Click on "Add" and fill in the required details.

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A storage account named 'tanvi' is created in the resource group 'Blog'.

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4. Set up security: To ensure that patient data is secure, you can set up security measures such as firewalls, virtual networks, and access controls. You can do this in the Azure portal under the "Security + Compliance" tab.

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5. Integrate with EHR systems: To access patient data from EHR (Electronic Health Record) systems, you can use Azure API for FHIR. For this you need to deploy Azure API for FHIR.

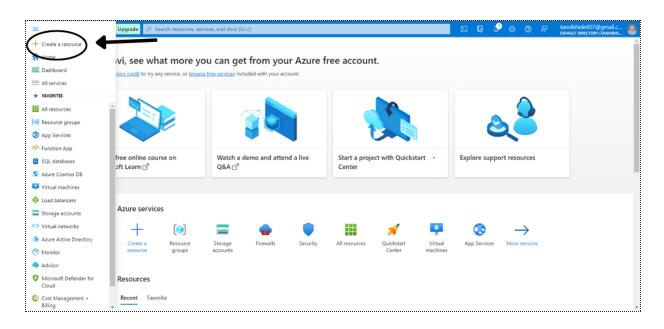
6. Analyze patient data: You can use Azure's analytics services such as Azure Data Factory and Azure Machine Learning to analyze patient data and gain insights into patient health. These services can be set up in the Azure portal under the "Analytics" tab.

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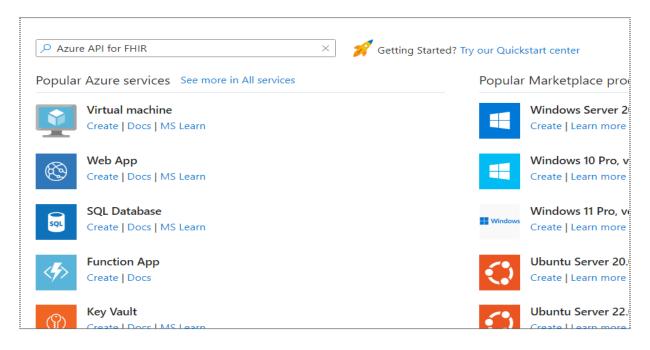
7. Manage resources: Using Azure's monitoring and management capabilities, you can manage resources once your healthcare data management system has been configured there. Utilizing these tools, you may monitor consumption, performance, expenses, and adjustments will be made as necessary.

Deploy Azure API for FHIR using Azure portal

1. Create a new resource



2. Search for Azure API for FHIR



3. Create Azure API for FHIR account

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4. Enter account details

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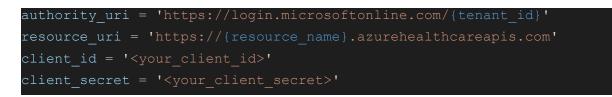
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Implementation in VSCode

1. Import necessary libraries



2. Define authentication credentials

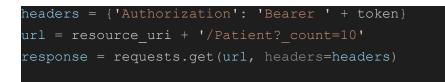


Replace the {tenant_id}, {resource_name}, {client_id} and {client_secret} placeholders with your actual authentication credentials

3. Authenticate

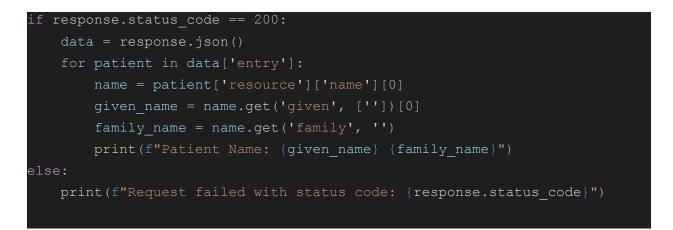


Make a GET request to the FHIR API:



This sends a GET request to the FHIR API, requesting a list of 10 patient records.

4. Parse the response



This checks if the response status code is 200 (i.e., if the request was successful), and if so, parses the JSON response and prints out the name of each patient in the list. In order to receive an access token, we must first login with Azure AD using our credentials (tenant ID, client ID, and client secret). In order to get patient data for a given patient ID, we next utilize this access token to issue a GET request to the FHIR API.

```
import adal
import requests
tenant id = '<your tenant ID>'
client id = '<your client ID>'
client secret = '<your client secret>'
fhir url = '<your FHIR API endpoint>'
patient_id = '<desired patient ID>'
context= adal.AuthenticationContext('https://login.microsoftonline.com/' +
tenant id)
token=context.acquire token with client credentials(fhir url, client id,
client secret)
headers = {'Authorization': 'Bearer ' + token['accessToken'],
'Content-Type': 'application/json'}
response = requests.get(fhir url + '/Patient/' + patient id,
headers=headers)
print(response.json())
```

A tenant is an instance of Azure AD that represents an organization.

An application that requires access to resources or services from Azure AD or other identity providers is referred to as a client. A web application, a mobile application, a desktop application, or even another service or API can serve as the client.

In order to request access to resources or services, a client must first register with Azure AD. Once registered, the client is given a special client ID and client secret that are used to authenticate and authorize the client.

Once we have the patient data in JSON format, we can use the FHIR client library to parse the data and extract the desired information (in this case, patient name, gender,

and birthdate). The FHIR client library provides a convenient way to work with FHIR resources in Python and handles the mapping of JSON data to Python objects.

```
from fhirclient import client
import json
# Assume patient_data is the JSON data returned from a GET request to the
FHIR API
# Create a FHIR client instance
fhir_client = client.FHIRClient(
    server_url='http://my-fhir-server-url.com/fhir',
    use_format_param=True,
    verify_ssl=False,
)
# Use the FHIR client to parse the patient data
parsed_data = fhir_client.resource('Patient', json.loads(patient_data))
# Extract patient name, gender, and birthdate
patient_name = parsed_data.name[0].given[0] + ' ' +
parsed_data.name[0].family
patient_gender = parsed_data.gender
patient_birthdate = parsed_data.birthDate.isostring
# Print out the extracted information
print('Patient Name: ' + patient_name)
print('Patient Gender: ' + patient_gender)
print('Patient Birthdate: ' + patient_birthdate)
```

In this illustration, we'll suppose that patient_data contains the JSON information that the FHIR API returned in response to a GET request. The patient name, gender, and birthday are extracted from the data using the FHIR client library. Finally, we print the information that was extracted.

Advantages of EHR

Electronic health records (EHRs) have a number of advantages in the healthcare industry, some of which are as follows:

- Efficiency gains: By giving healthcare professionals instant access to patient data including medical histories, test findings, and treatment plans, EHRs may streamline workflow and save time.
- Improved care coordination: EHRs make it simple for various healthcare professionals to communicate patient data, which can assist to guarantee that everyone engaged in a patient's treatment is on the same page.
- Savings: EHRs can assist in lowering the expenses related to paper-based records, such as printing, storing, and retrieving.
- Enhancing patient outcomes: EHRs can give healthcare professionals more thorough and accurate patient information, enabling improved decision-making and eventually improving patient outcomes.

Business Benefits

Using Azure FHIR API for EHR has various business advantages, including:

- Efficiency gain: Azure FHIR API makes it easier to store and retrieve patient health data, which can help healthcare practitioners work more effectively.
- Improved patient care: Azure FHIR API can enhance the standard of care given to patients by enabling rapid and simple access to a patient's medical history and health data.
- Savings: By offering a scalable, cloud-based solution that is simple to integrate with other healthcare systems, using Azure FHIR API can help lower the cost of operating and maintaining EHR systems.
- Increased interoperability: The Azure FHIR API makes use of a standardized data model to encourage interoperability between various healthcare systems and

organizations, which can improve care coordination and improve patient outcomes.

• Data security: Azure FHIR API offers strong security features, such as encryption, access controls, and compliance with legal standards like HIPAA, to safeguard patient health data.

In conclusion, electronic health records (EHR) have revolutionized the healthcare sector by giving professionals access to patient health data from a single location at any time. EHR system adoption provides a number of advantages, including better patient care, more effective healthcare delivery, fewer medical mistakes, and higher patient participation. Moreover, by using the Azure FHIR API, EHR systems have improved and made healthcare analytics possible, which may aid healthcare companies in making wise decisions.