# EXAFLUENCE
## Data Driven Influence

# The Decision-Maker's Guide to FHIR

Buy off-the-shelf, partner up, or build it yourself?

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*May 2023*

## The Benefits of FHIR

HL7 FHIR (Fast Healthcare Interoperability Resources) is a data standardthat promotes secure and easy healthcare information sharing.

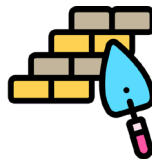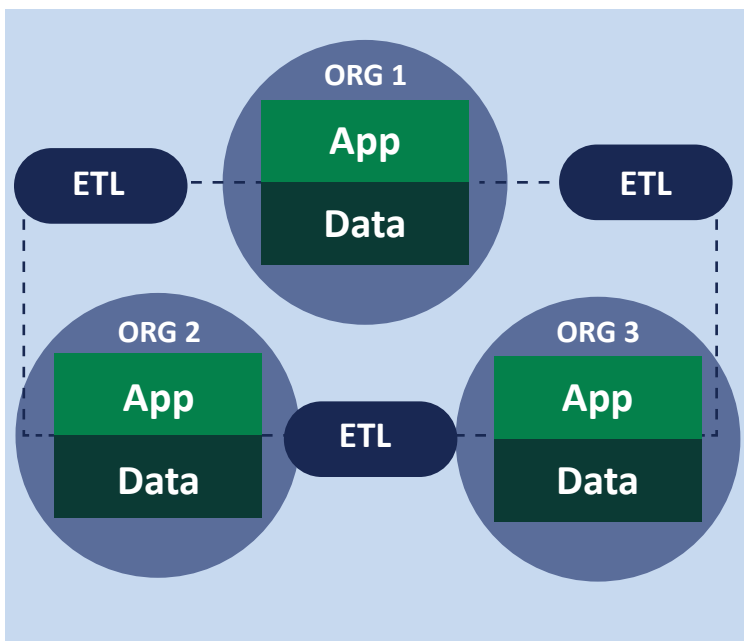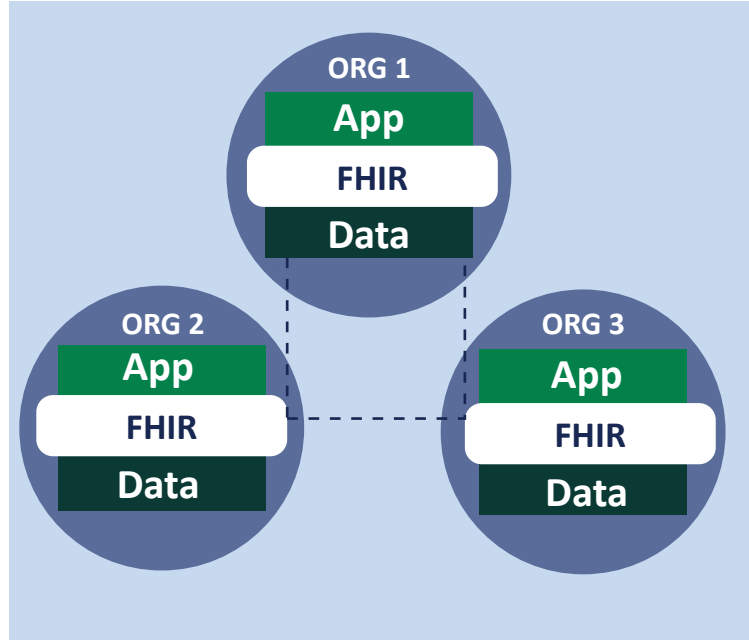|  |  |  |
|---|---|---|
| Use out-of-the-box interoperability resources or adapt them | RESTful framework for information exchange | A focus on fast and easy implementation |
| Evolutionary development path from HL7 Version 2 and CDA | Strong foundation in web standards | Multiple implementation libraries available to kick-start development |
| Concise and easily understood specifications | Specification is free for use with no restrictions | A human-readable serialization format for easeof use by developers |

# FHIR provides a new way to share and manage data simplifying development, reducing data silos, and ultimately moving healthcare to an interoperable model.

## Without FHIR



**ORG 1**
App
Data

ETL

ETL

**ORG 2**
App
Data

**ORG 3**
App
Data

ETL

Without FHIR, complex and costly ETL jobs are required to copy and transform the data before it can be used

## With FHIR



**ORG 1**
App
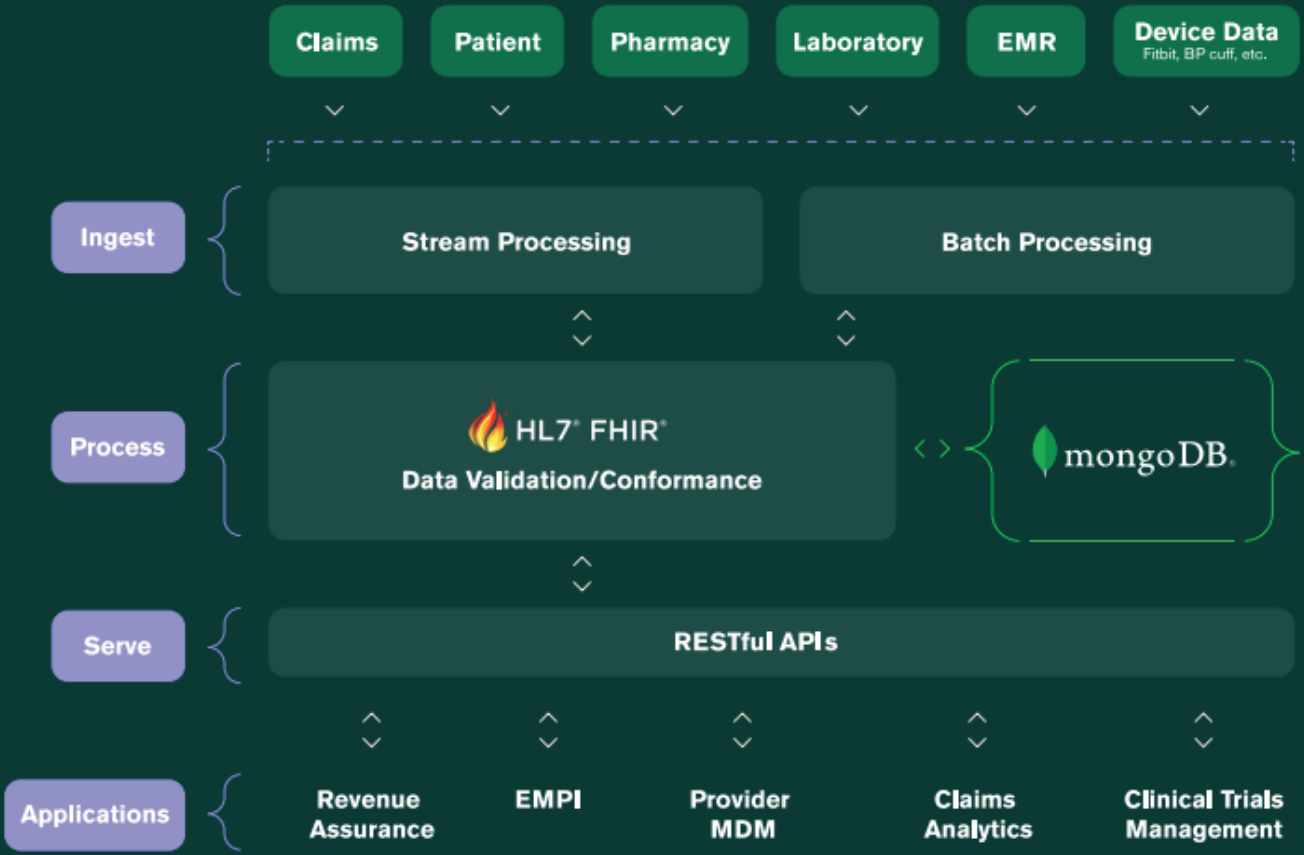FHIR
Data

**ORG 2**
App
FHIR
Data

**ORG 3**
App
FHIR
Data

Shared data is managed and made available via a common FHIR REST API layer and database

# FHIR Architecture Fundamentals

## Your FHIR solution typically contains four layers:

| Claims | Patient | Pharmacy | Laboratory | EMR | Device Data |
| --- | --- | --- | --- | --- | --- |
| | | | | | Fitbit, BP cuff, etc. |

**Ingest**

| Stream Processing | Batch Processing |
| --- | --- |

**Process**

🔥 HL7® FHIR®
Data Validation/Conformance

🍃 mongoDB.

**Serve**

RESTful APIs

**Applications**

Revenue Assurance | EMPI | Provider MDM | Claims Analytics | Clinical Trials Management
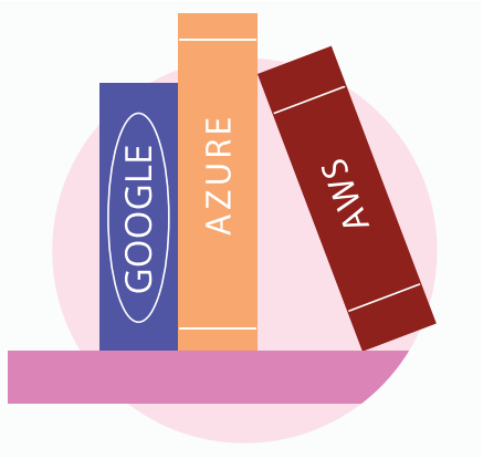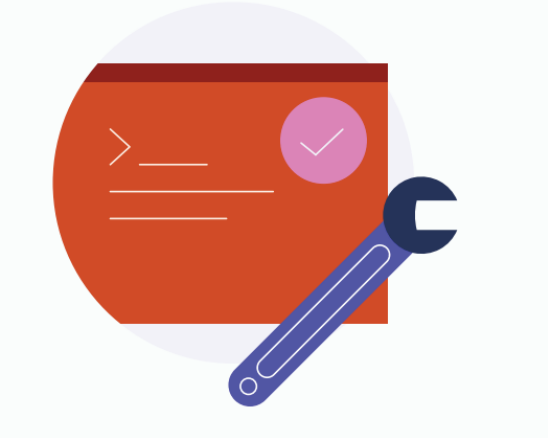
# For decision-makers, your FHIR solution comes down to one of three options:

## Build It Yourself

**Build your own FHIR solution, including the API. Best for large organizations with experienced development teams.**

Although this option offers unlimited flexibility, wouldn't your teams be better off developing customer-facing apps and services, rather than maintaining your FHIR solution?

## Use Off-the-Shelf Softyare

**Google Cloud Healthcare API, Microsoft Azure API for FHIR, and AWS FHIR Works all offer FHIR API and database solutions.**

This can be the fastest way to spin up your FHIR solution, but there are drawbacks:

- Cloud only (no on premises)
- Vendor lock-in and no multi-cloud flexibility
- Limited access to underlying database
- New application and/or custom development might be limited

## Use a Customizable Turnkey Solution

**The middle ground between off-the-shelf and build it yourself. Combine a purpose-built API and the ideal database for FHIR, MongoDB, gaining:**

- Deployment flexibility (on premises, cloud, multi-cloud)
- Integration with legacy systeml
- Flexibility to develop additional solutions on top of your data

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## For an all-in-one FHIR solution, MongoDB has partnered with FHIR experts Exafluence to offer:

- Support for real-time and batch-data ingestion
- Smart integration with automated mapping to the native FHIR format
- Flexible deployment options ^multi-cloud, on-premises]
- Native FHIR data in MongoDB to extend and build to suit your business

# To get the most from FHIR and truly embrace interoperability, the data platform you choose must natively support FHIR's JSON data format.

This makes MongoDB's document data model, with its native JSON support, an ideal FHIR companion.

## Tabular (Relational) Data Model

Related data split across multiple records and tables, resulting in:

- Rigid and inflexible schema
- Complexity in understanding the data
- Increased processing overhead
- Query complexity

## Document Data Model

Related data contained in a single, rich JSON document, ensuring:

- JSON in
- JSON stored
- JSON queried
- JSON out

### 🔥 HL7 FHIR

```
{
    "_id"  :  ObjectId("5ad88534e3632e1a35a58d00"),
    "name"  :  {
        "first"  :  "John",
        "last"  :  "Doe"},
    "address"  :  [
        {  "location"  :  "work",
           "address"  :  {
               "street"  :  "16 Hatfields",
               "city"  :  "London"}},
        •  {...}
    ];
    "dob"  :  ISODate("1977-04-01T05:00:00Z"),
    "Patient Number"  :  NumberDecimal("1292815.75")
}
```

```
{
    "_id"  :  ObjectId("5ad88534e3632e1a35a58d00"),
    "name"  :  {
        "first"  :  "John",
        "last"  :  "Doe"},
    "address"  :  [
        {  "location"  :  "work",
           "address"  :  {
               "street"  :  "16 Hatfields",
               "city"  :  "London"}},
        •  {...}
    ];
    "dob"  :  ISODate("1977-04-01T05:00:00Z"),
    "Patient Number"  :  NumberDecimal("1292815.75")
}
```

### Parser

Application

Database

### Document

```
{
    "_id"  :  ObjectId("5ad88534e3632e1a35a58d00"),
    "name"  :  {
        "first"  :  "John",
        "last"  :  "Doe"},
    "address"  :  [
        {  "location"  :  "work",
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               "street"  :  "16 Hatfields",
               "city"  :  "London"}},
        •  {...}
    ];
    "dob"  :  ISODate("1977-04-01T05:00:00Z"),
    "Patient Number"  :  NumberDecimal("1292815.75")
}
```

Application

Database

Application

### Query Parser

```
{
    "_id"  :  ObjectId("5ad88534e3632e1a35a58d00"),
    "name"  :  {
        "first"  :  "John",
        "last"  :  "Doe"},
    "address"  :  [
        {  "location"  :  "work",
           "address"  :  {
               "street"  :  "16 Hatfields",
               "city"  :  "London"}},
        •  {...}
    ];
    "dob"  :  ISODate("1977-04-01T05:00:00Z"),
    "Patient Number"  :  NumberDecimal("1292815.75")
}
```
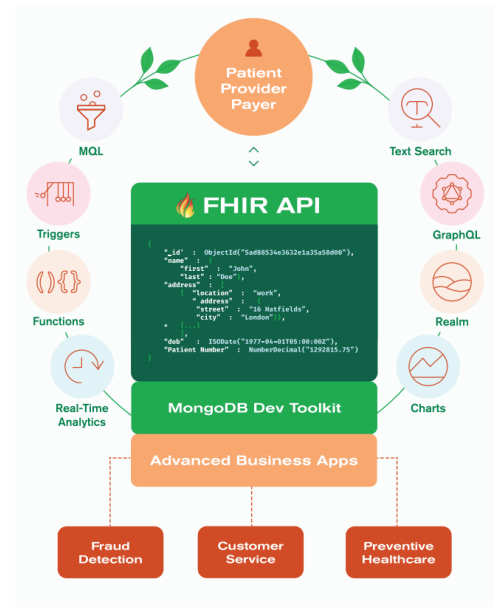
Application

# MongoDB:

## Do more with your FHIR data

**Why buy and build a technology that's already a part of the underlying MongoDB platform?**

> Use MongoDB s toolset to develop value-add business solutions on the FHIR-native dataset without ETL



# MongoDB and MongoDB Atlas:

## FHIR from the cloud to the edge and on premises

With native JSON support, as well as ad hoc queries, indexing, and real-time aggregation to access and analyze your data, MongoDB is uniquely suited to FHIR and an interoperable future.

And with MongoDB Atlas, MongoDB's global cloud database service, your FHIR applications and data are free to work across multiple clouds.

### Rapid FHIR

The fastest way to build FHIR applications

### Multi-Cloud

Have the best of all clouds and distribute FHIR data and applications on AWS, Google Cloud, and Microsoft Azure

### HIPAA

MongoDB Atlas is HIPAA ready and supports the latest in end-to-end encryption

### Patient 360

Create a single view of the patient from disparate databases, systems, and data formats

**Find out more at ExfHealth.io**

**Learn More**