

# eICU

## the code runners

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Robert Allen, Sonal Jain, Ryan Jones, Sruti Khanna,  
Darshini Nanavati, Andrew Teng

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# eICU

electronic intensive care unit

Optimize clinical expertise and facilitate 24/7 care by bedside ICU caregivers

eICU caregivers have real-time patient data and can communicate with bedside caregivers

The Emory eICU center serves multiple hospitals under the Emory Healthcare umbrella as well as East Georgia Regional (total of 136 beds)

Bottom line: conserve resources and save lives

# EMORY

## eICU CENTER



UNIVERSITY  
HOSPITAL

UNIVERSITY  
HOSPITAL  
MIDTOWN

JOHNS CREEK  
HOSPITAL

 SAINT JOSEPH'S  
HOSPITAL



# Existing Infrastructure

**EMORY**  
HEALTHCARE



- Data from labs or created by Cerner PowerChart
- Information on vitals, flowsheet data
- Medications
- HL7 messages

**EAST GEORGIA**  
REGIONAL MEDICAL CENTER

- Manual and direct lab data (from various systems)
- Information on vitals, flowsheet data
- Medications (CPOE)
- HL7 messages

**PHILIPS**  
VISICU

**eCareManager**

- Interactive Dashboard
- Data Visualizations
- Patient summaries



**eSearch**

- Simplified UI for reports
- Combine data sources



**archiveDB**

- Copy of eCM
- Clinical Data Warehouse
- Reduced Dataset
- “Real-time” clean data

# Project Goal



archiveDB



FHIR

fast healthcare  
interoperability resources

Develop a FHIR adapter for the existing archiveDB to create an exchange of **FHIR compliant messages** to and from the archiveDB of the eICU system

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# Technologies

## Front-End



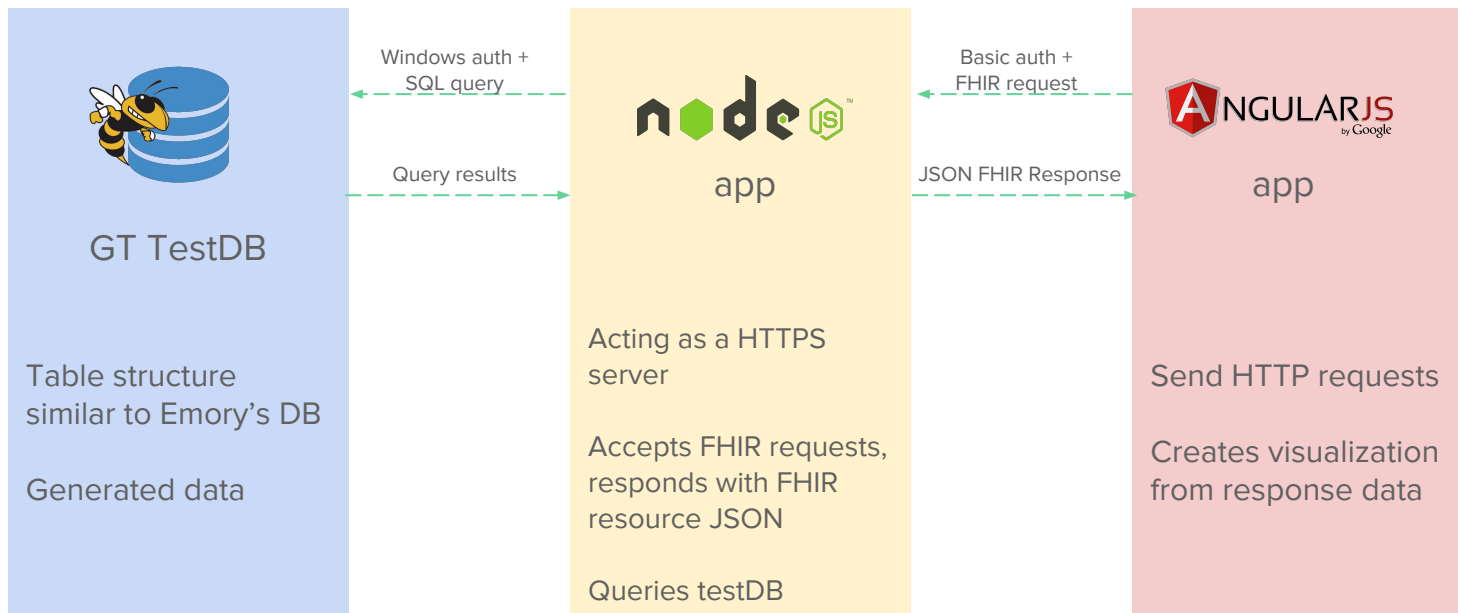
## Back-End



# Architecture & Data Flow

GT I3L Windows Server 2012

Hosted locally on  
dev laptop



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# Data



GT TestDB



FHIR

GET /patient/

```
{
- resource: {
  resourceType: "Bundle",
  total: 192,
  - entry: [
    - {
      resourceType: "patient",
      id: "01CB1E42-F5B5-49DB-A727-907CF0C1BB2C",
      - identifier: [
        - {
          system: "SSN",
          value: "724-13-0000"
        }
      ],
      - name: {
        - family: [
          "Shannon"
        ],
        - given: [
          "Declan"
        ]
      },
      gender: "male",
      birthDate: "2003-01-05T00:00:00.000Z",
      telecom: { }
    },
    - {
      resourceType: "patient",
      id: "021F20C4-71C2-4B05-AAE6-1981E868CFB0",
      - identifier: [
```

# Data



GT TestDB



FHIR

GET /observation/

```
{
- resource: {
  resourceType: "Bundle",
  total: 2696,
- entry: [
  - {
    resourceType: "observation",
    id: "913B58F3-5F7F-4D0B-B62A-8DF73FB6A734",
    - code: {
      - coding: [
        - {
          system: "http://loinc.org",
          code: "2160-0",
          display: "Creatinine [Mass/volume] in Serum or Plasma"
        }
      ]
    },
    - subject: {
      reference: "patient/B1D40BBB-CF95-4B1C-8728-763457AAC909"
    },
    - encounter: {
      reference: "Encounter/C15746FD-3DCE-428B-897D-A829EDFA3C35"
    },
    effectiveDateTime: "2010-01-06T08:10:00.000Z",
    - valueQuantity: {
      value: 0.63,
      unit: "mg/dL",
      system: "http://unitsofmeasure.org"
    }
  },
- {
  resourceType: "observation",
  id: "86370C0D-DC53-4299-97ED-9A9010DFB33D",
  - code: {
    - coding: [
```

# Data



GT TestDB



FHIR

GET /observation?deltaT=true&subject=81D40BB-CF95

```
{
  - resource: {
    resourceType: "Bundle",
    total: 6,
    - entry: [
      - {
        resourceType: "observation",
        id: "913B58F3-5F7F-4D0B-B62A-8DF73FB6A734",
        - code: {
          - coding: [
            - {
              system: "http://loinc.org",
              code: "2160-0",
              display: "Creatinine [Mass/volume] in Serum or Plasma"
            }
          ]
        },
        - subject: {
          reference: "patient/B1D40BBB-CF95-4B1C-8728-763457AAC909"
        },
        - encounter: {
          reference: "Encounter/C15746FD-3DCE-428B-897D-A829EDFA3C35"
        },
        effectiveDateTime: "",
        - valueQuantity: {
          value: "",
          unit: "mg/dL",
          system: "http://unitsofmeasure.org",
          deltaValue: 0.7100000000000001
        },
        deltaEffectiveDateTime: 0.9881944444444445,
        timeInterval: "days"
      },
      - {
        resourceType: "observation",
        id: "86370C0D-DC53-4299-97ED-9A9010DFB33D",
        - code: {
          coding: [
```

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# Challenges

- Data access
- SQL mapping
- Movable and resizable charts
- Expectations vs. feasibility

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# What's Next?

- Complete a population-based view
- Enable additional FHIR resources
- Add more custom FHIR extensions
- Conduct user testing



# Special Thanks



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IPaT Research Scientist

# Questions?

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