Electronic Medical Records and Javascript Object Notation(JSON)

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Objectives

Electronic Medical Record (EMR)

- Describe electronic medical record
- Describe the purpose and uses of EMR
- Explain the mission of EMR in hospital value chain
- Distinguish 5 benefits of an EMR
- Classify risks when implementing an EMR

Objectives

Fast Healthcare Interoperability Resources (FHIR)

- Describe FHIR and Javascript Object Notation (JSON)
- Create JSON EMR
- Examine how to fetch data from JSON and parse it with PHP
- Analyze EMR android app design

What is an Electronic Medical Record (EMR)?

An electronic medical record (EMR) is a digital version of the traditional paper-based medical record for an individual.

The EMR represents a medical record within a single facility, such as a doctor's office or a clinic.

The Purpose and Uses of EMR

Primary Purpose: To assist health professionals in providing the most effective patient care

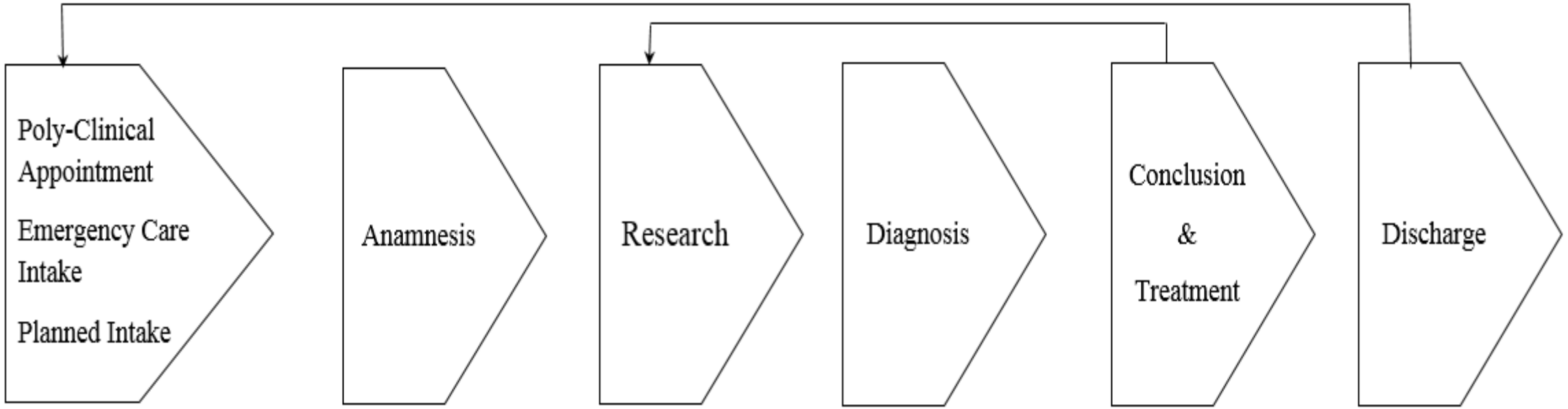
Secondary Uses: Billing and reimbursement, legal issues, research, education…

The Purpose and Uses of EMR

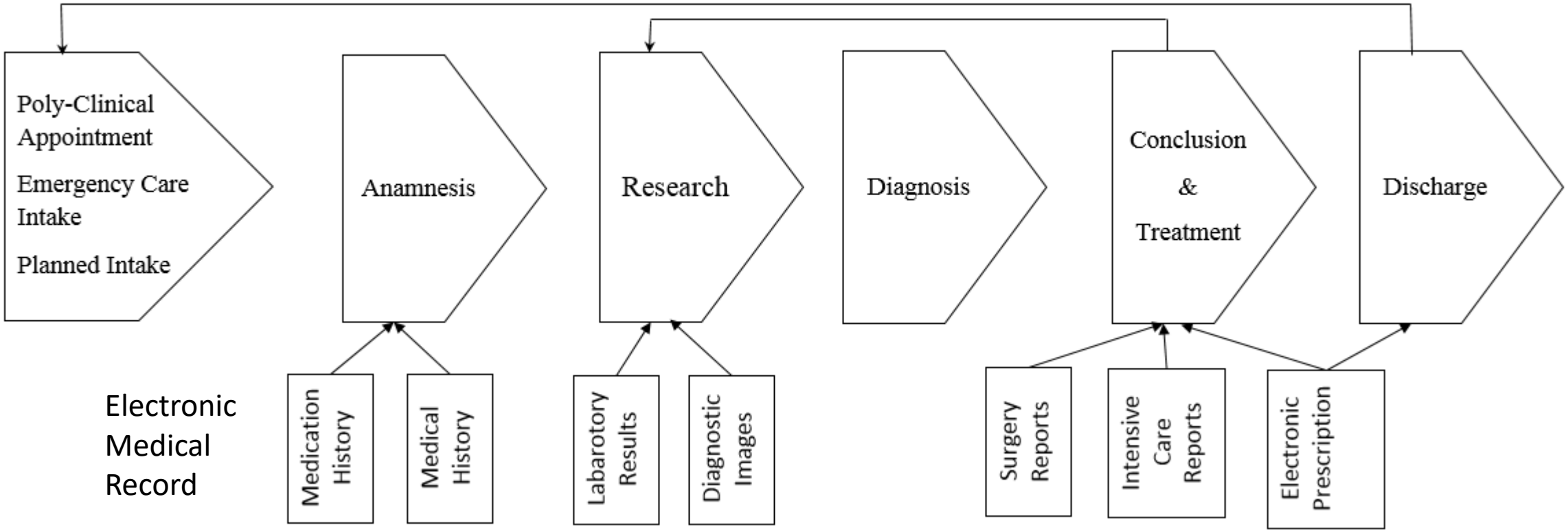
Online Patient Engagement Functionality	Percent of Hospitals with Capability			
	2012	2013	2014	2015
Online Capabilities Incentivized by Federal Policy				
View information from health/medical record	24%	39.8%	90.8%	95.1%
Download information from health/medical record	14.3%	27.8%	82.2%	86.8%
Transmit care/referral summaries to a third party	N/A[1]	11.6%	66.4%	71.5%
View, download and transmit health information	N/A[1]	10%	64%	68.8%
Secure messaging with health care provider*	N/A[1]	N/A[1]	51.3%	63%

Office of the National Coordinator for Health Information Technology. (2016) 'U.S. Hospital Adoption of Patient Engagement Functionalities,' Health IT Quick-Stat #24.

The Hospital “Value Chain”



The Mission of EMR in the Hospital



Benefits of EMR

Accurate, up-to-date, and complete information about patients at the point of care

Helping providers more effectively diagnose patients, reduce medical errors, and provide safer care

Improving patient and provider interaction and communication, as well as health care convenience

Reducing costs through decreased paperwork, improved safety, reduced duplication of testing, and improved health.

Enabling providers to improve efficiency and meet their business goals

Risks: Security

	2010	2011	2012	2013	2014	2015
Type of Information Breach						
Hacking/IT incident	568,358	297,269	900,684	236,897	1,786,630	111,812,172
Improper disposal	34,587	63,948	21,329	526,538	93,612	82,421
Loss	924,909	6,019,578	95,815	142,411	243,376	47,214
Theft	3,691,460	4,720,129	927,909	5,397,989	7,058,678	740,598
Unauthorized access/disclosure	130,106	118,444	338,767	383,759	3,019,284	572,919
Other breach	158,593	13,981	503,900	254,305	413,878	--

U.S. Department of Health and Human Services (HHS) Office for Civil Rights. Breaches Affecting 500 or More Individuals. Febrauary 1, 2016.

Largest Information Breaches

Health Care Provide	State	Patients Affected	Type of Breach	Date
TRICARE	Virginia	4,901,432	Loss of backup tapes	Sept. 13, 2011
Health Net, Inc.	California	1,900,000	Unknown	Jan. 21, 2011
North Bronx Healthcare Network	New York	1,700,000	Electronic medical record theft	Dec. 23, 2010
AvMed, Inc.	Florida	1,220,000	Laptop theft	Dec. 10, 2009
The Nemours Foundation	Florida	1,055,489	Loss of backup tapes	Aug. 10, 2011
Blue Cross Blue Shield of Tennessee	Tennessee	1,023,209	Hard drive theft	Oct. 2, 2009
Sutter Medical Foundation	California	943,434	Desktop computer theft	Oct. 15, 2011
South Shore Hospital	Massachusetts	800,000	Loss of portable electronic device	Feb. 26, 2010
Utah Department of Health	Utah	780,000	Hacking	March 10, 2012 to April 2, 2012
Eisenhower Medical Center	California	514,330	Computer theft	11-Mar-11

U.S. Department of Health and Human Services (HHS) Office for Civil Rights. Breaches Affecting 500 or More Individuals. Febrauary 1, 2016.

Risks: Data Exchange

While EMRs work well within a practice, they're limited because they don't easily travel outside the practice.

In fact, the patient's medical record might even have to be printed out and mailed for another provider to see it.

Fast Healthcare Interoperability Resources

http://www.hl7.org/fhir

Pronounced “FIRE”

Build around the concept of “resources”

Resources represent granular clinical concepts

Javascript Object Notation

A resource in FIRE is modeled by Javascript Object Notation(JSON)

JSON is a lightweight data-interchange format

It is in human readable format

It is easy for machines to parse and generate

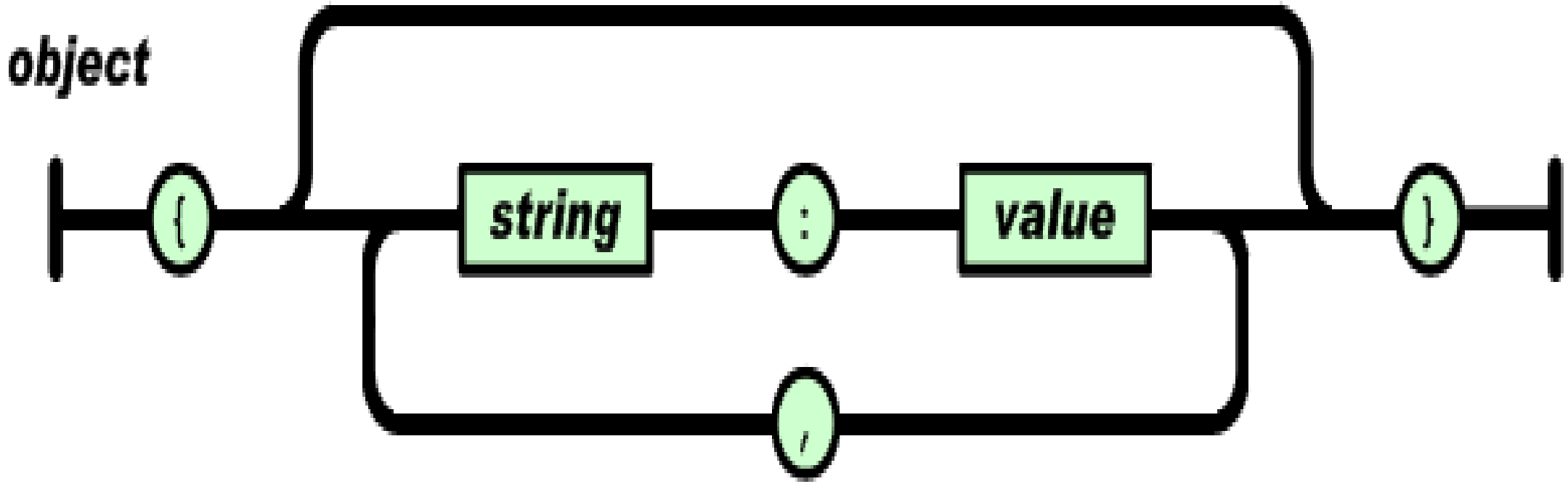
Javascript Object Notation

JSON in built on two structures:

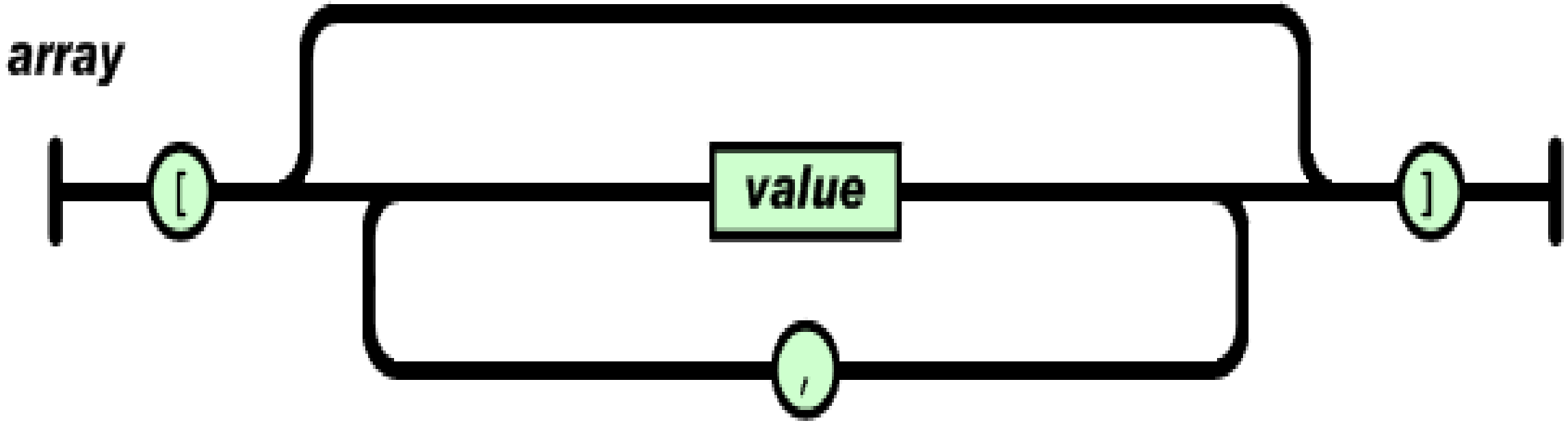
Object: A collection of name/value pairs

Array: An ordered list of values

Javascript Object Notation



Javascript Object Notation



Javascript Object Notation Example

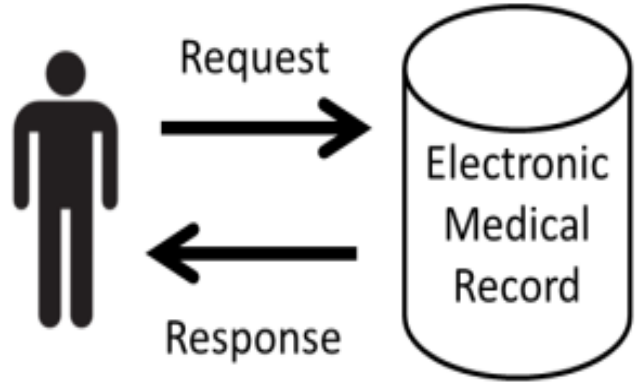

```
{
"labresults":[
{
"resultid": "WH555444",
"name": "Evren Eryilmaz",
"ldllevel":"122.5",
"ldlresultdate":"07/21/2016"
},
{
"resultid": "WH567984",
"name": "Evren Eryilmaz",
"ldllevel":"128",
"ldlresultdate":"10/24/2016"
}
]
}
```

Javascript Object Notation Example


```
{
"medicalrecords":[
{
"recordid": "WH555444",
"patientname": "Rebecca Smith",
"diagnosedproblem":"Flu",
"giventreatment":"Take an antibiotic pill in every 6 hours"
},
{
"resultid": "WH567984",
"name": "Scott Johnson",
"diagnosedproblem":"Muscle aches",
"giventreatment":"Use topical pain relief cream"
}
]
}
```

Parse JSON with PHP

```php
<?php
    $jsondata= file_get_contents("patients.json");
    $json=json_decode($jsondata,true);
    echo $json['patients'][0]['ID'];
?>
```



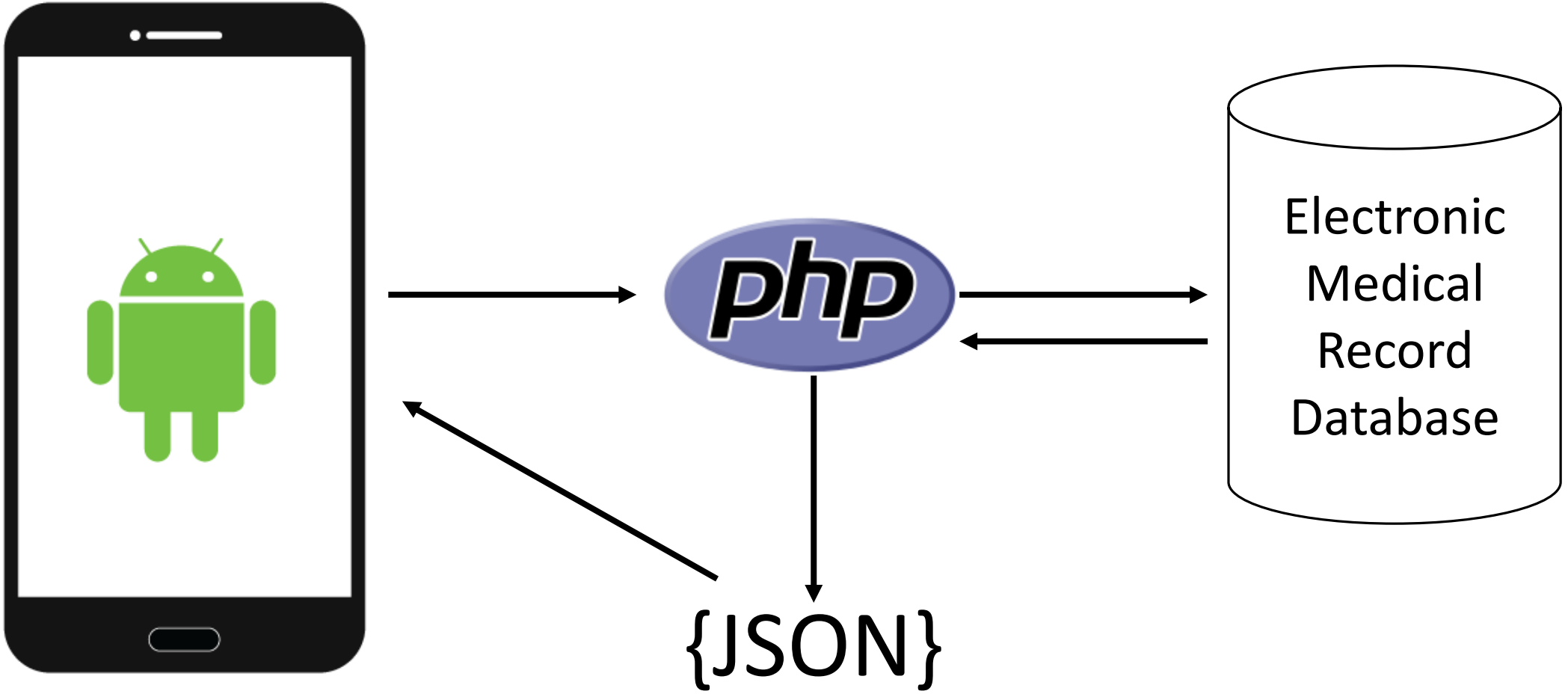
Parse JSON with PHP

```php
<?php
    $jsondata= file_get_contents("patients.json");
    $json=json_decode($jsondata,true);

    $output="<ul>";
    foreach($json['patients'] as $patient){
        $output.="<h4>".$patient['ID']."</h4>";
        $output.="<li>Name:".$patient['Name']."</li>";
        $output.="<li>LDLLevel:".$patient['LDLLevel']."</li>";
        $output.="<li>LDLResultDate:".$patient['LDLResultDate']."</li>";
    }
    $output .="</ul>";
    echo $output;
?>
```

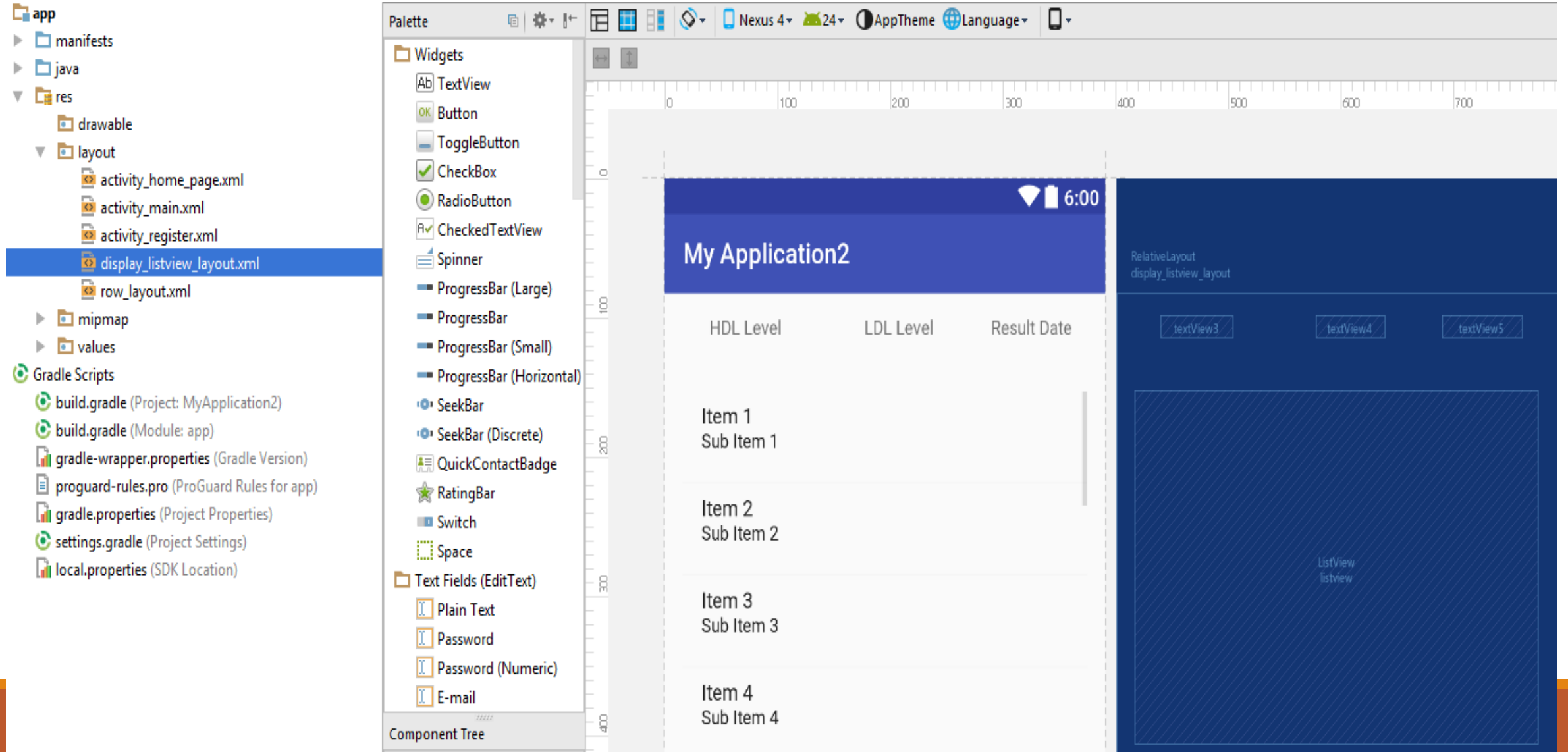
Parse JSON with PHP

```php
<?php
//in php we create variables with the dollar symbol

    $jsondata= file_get_contents("patients.json");
    $json=json_decode($jsondata,true);

    $output="<ul>";
    foreach($json['patients'] as $patient){
        if($patient['LDLLevel']>"159")
        {
        $output.="<h4>".$patient['ID']."</h4>";
        $output.="<li>Name:".$patient['Name']."</li>";
        $output.="<li>LDLLevel:".$patient['LDLLevel']."</li>";
        $output.="<li>LDLResultDate:".$patient['LDLResultDate']."</li>";
        }
    }
    $output .="</ul>";
    echo $output;
?>
```

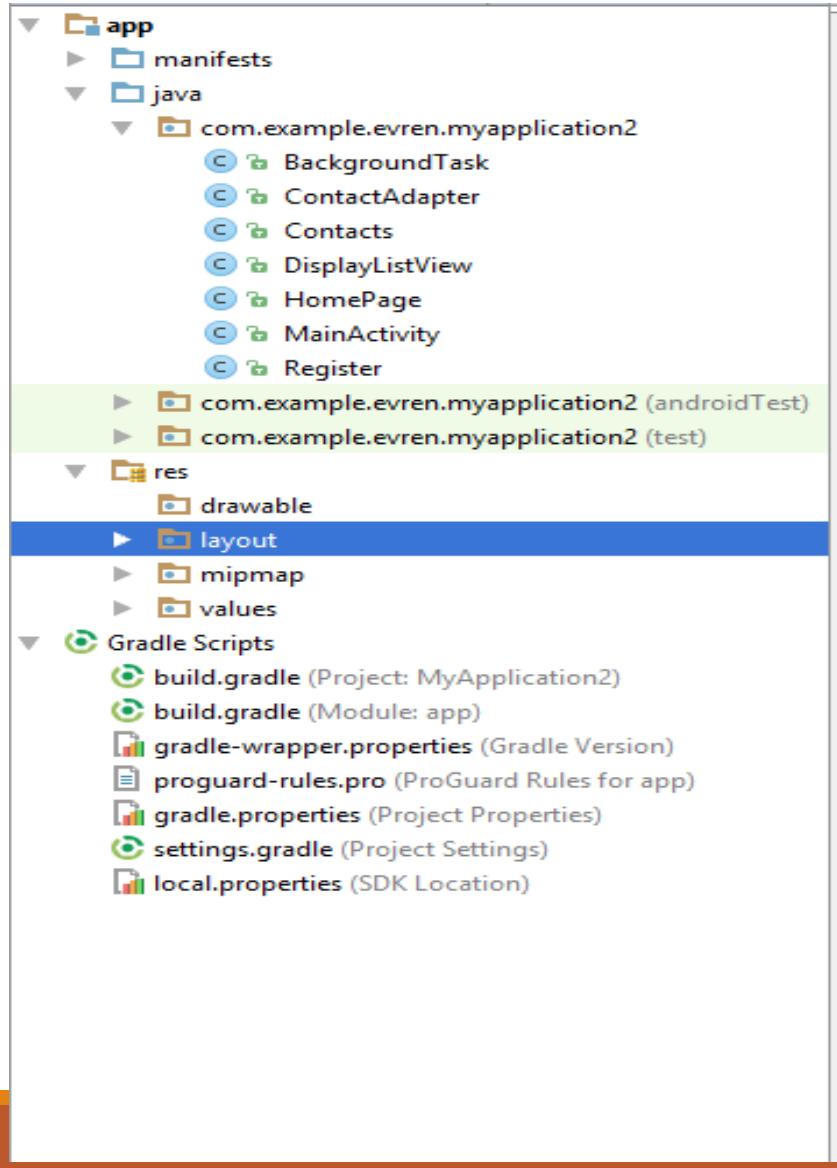
Android App Design



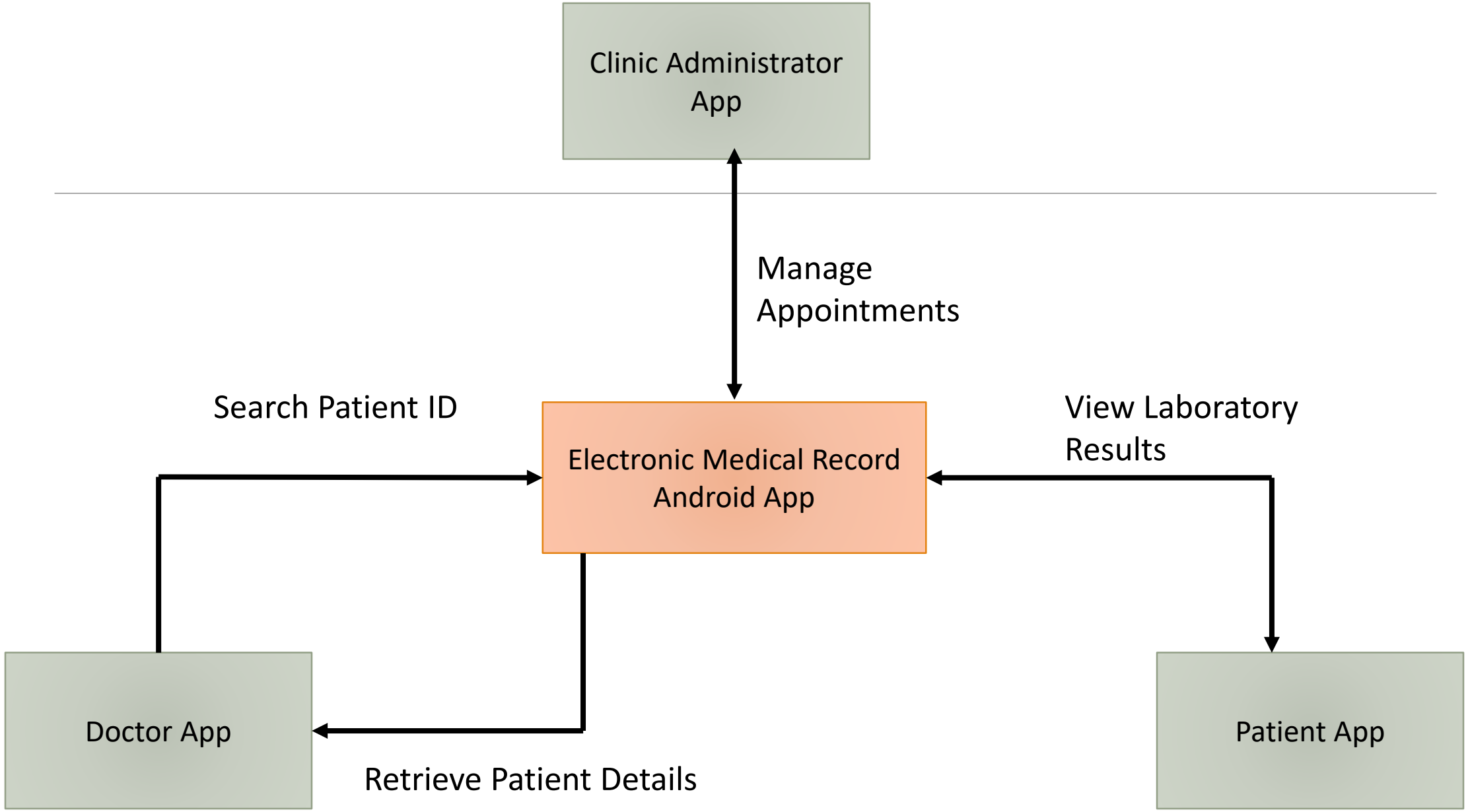
Android Studio



Android Studio




```
package com.example.evren.myapplication2;

import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.view.View;
import android.content.Intent;
import android.widget.EditText;



public class MainActivity extends AppCompatActivity {

    EditText ET_NAME,ET_PASS;
    String login_name,login_pass;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        //we have to initalize edittext
        ET_NAME = (EditText)findViewById(R.id.user_name);
        ET_PASS = (EditText)findViewById(R.id.user_pass);

    }
    public void userReg(View view) { startActivity(new Intent(this,Register.class)); }
    //when user clicks on the login method this method will invoke
public void userLogin(View view)
{
    login_name = ET_NAME.getText().toString();
    login_pass = ET_PASS.getText().toString();
    String method = "login";
    //there is constructor in the background task in the other file
    BackgroundTask backgroundTask = new BackgroundTask(this);
    backgroundTask.execute(method,login_name,login_pass);

    Intent i = new Intent(this, HomePage.class);
    startActivity(i);

}
```


Clinic Administrator App
Manage Appointments
Search Patient ID
Electronic Medical Record Android App
View Laboratory Results
Doctor App
Retrieve Patient Details
Patient App

Thank you for your time and attention!

Questions?

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