**Test Plan: HealthSync**

**1. Test Objectives**

* Verify the functionality of all modules: EHR, Appointment Scheduling, Billing, Telemedicine, Analytics, and Patient Portal.
* Ensure seamless integration between different modules and with external systems (Lab Systems).
* Validate data integrity and consistency across the platform.
* Confirm system performance and scalability under expected user loads.
* Assess the security of the platform and protect patient data.
* Ensure compliance with HIPAA and other relevant regulations.
* Evaluate usability and user experience of the web and mobile applications.

**2. Test Scope**

* **Client Layer:**
  + Web Application (React.js): Test UI functionality, responsiveness, and compatibility across different browsers and devices.
  + Mobile App: Test app functionality, performance, and compatibility across different mobile operating systems and devices.
* **API Gateway Layer:**
  + API Gateway (Express.js/Node.js): Test API endpoints, request/response handling, and security.
* **Microservices Layer:**
  + EHR Service, Scheduling Service, Billing Service, Telemedicine Service, Analytics Service, Patient Portal Service: Test individual service functionality, data access, and inter-service communication.
* **Data Layer:**
  + PostgreSQL (Relational Data): Test data integrity, queries, and database performance.
  + MongoDB (Unstructured Data): Test data storage, retrieval, and schema flexibility.
  + Elasticsearch: Test search functionality, indexing, and performance.
* **External Integration Layer:**
  + HL7/FHIR Gateway: Test integration with lab systems using HL7/FHIR standards.
  + Payment Gateway: Test secure payment processing and integration with billing services.
  + Redis Cache: Test caching mechanisms and performance improvements.

**3. Test Environment**

* Testing will be conducted in a dedicated test environment that mirrors the production environment as closely as possible.
* This includes:
  + Test servers with the same hardware and software configurations as production servers.
  + Network connectivity simulating real-world conditions.
  + Test data that is representative of actual patient data (with appropriate anonymization and security measures).

**4. Test Cases**

* Test cases will be developed for each module and integration point, covering:
  + Functional testing: Verify that each feature works as expected.
  + Integration testing: Ensure that different modules and external systems work together correctly.
  + Performance testing: Evaluate system performance under different load conditions.
  + Security testing: Identify and mitigate security vulnerabilities.
  + Usability testing: Assess the user-friendliness of the platform.
  + Compliance testing: Verify adherence to HIPAA and other regulations.

**5. Test Schedule**

* Testing will be conducted in phases, starting with unit testing during development, followed by integration testing, system testing, and user acceptance testing (UAT).
* A detailed test schedule will be created and tracked in the project management tool.

**6. Test Deliverables**

* Test Plan document
* Test Case specifications
* Test Execution reports
* Defect Log