**Project Workflow & Stages**

This workflow shows how the project would progress from **start to deployment**, specifically for a healthcare assistant powered by **IBM Granite**.

**🧩 1. Problem Definition & Requirements Gathering**

* Identify key use cases:
  + Symptom checker
  + Patient Q&A
  + Appointment scheduling
  + Medical record summarization
* Meet with stakeholders (doctors, patients, admins)
* Define goals, scope, and KPIs (accuracy, response time, compliance)

**🧩 2. Data Collection & Integration**

* Collect sample health data (anonymized EHRs, medical text)
* Integrate with APIs:
  + EHR systems (FHIR, HL7)
  + Scheduling and user databases
* Identify external knowledge sources (ICD codes, drug databases, CDC/WHO guidelines)

**🧩 3. Model Selection and Customization**

* Use **IBM Granite** LLM from watsonx.ai
* Fine-tune the Granite model for healthcare NLP:
  + Custom prompts for patient interaction
  + Domain-specific terminology
  + Safety filters for hallucinations or misinformation

**🧩 4. System Design & Architecture Planning**

* Design overall architecture (frontend, backend, AI model, databases)
* Ensure scalability, security, and modularity
* Set up cloud infrastructure (preferably IBM Cloud)

**🧩 5. Frontend & Backend Development**

* **Frontend**: Build chatbot or voice UI using React/Flutter
* **Backend**:
  + API Gateway
  + Prompt handler and Granite API interface
  + Session and context manager
* Use REST/GraphQL to handle requests

**🧩 6. Model Integration**

* Connect backend to IBM Granite via watsonx.ai API
* Implement:
  + Prompt generation pipeline
  + Response filtering and ranking
  + Logging and error handling

**🧩 7. Testing & Evaluation**

* **Unit testing** for UI, backend, and APIs
* **Model evaluation**: Accuracy, safety, latency, and relevance
* Collect feedback from test users (doctors, nurses, patients)
* Perform load and stress testing

**🧩 8. Security, Compliance & Auditing**

* Implement HIPAA/GDPR compliance modules
* Role-based access control (RBAC)
* Encrypt data at rest and in transit
* Enable logs, audit trails, and incident reporting

**🧩 9. Deployment & Monitoring**

* Deploy on IBM Cloud or hybrid Kubernetes setup
* Use CI/CD pipelines (Jenkins, GitHub Actions)
* Set up monitoring (IBM Instana, Prometheus, Grafana)
* Feedback loop for continuous learning and improvement

**🧩 10. User Training & Documentation**

* Train hospital staff and users
* Provide manuals and SOPs
* Create feedback channels and support system

**🔄 Workflow Summary Diagram (Textual View):**

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[1] Requirements →

[2] Data Integration →

[3] Granite Model Customization →

[4] Architecture Design →

[5] Development →

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