Requirement Gathering and Analysis Phase

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Project Name: NEXUS: Social Media App (MERN)

Maximum Marks: —

# Solution Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:  
• Find the best tech solution to solve existing business problems.  
• Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.  
• Define features, development phases, and solution requirements.  
• Provide specifications according to which the solution is defined, managed, and delivered.

NEXUS : Social Media App (MERN) – Architecture

START

1. \*\*User Interaction Layer\*\*

- User creates an account or logs in

- Inputs: Email/Username, Password

- Authentication: JWT, bcrypt password hashing

- User navigates the app

- Browses posts

- Creates posts

- Interacts via likes and comments

- Explores trending content

2. \*\*Frontend (Presentation Layer)\*\*

- Technologies: React.js/Next.js (for SPA/SSR)

- Features:

- Intuitive UI for content creation

- Dynamic feed rendering

- Responsive design for multiple devices

- API calls to the backend for data retrieval and updates

3. \*\*Backend (Application Layer)\*\*

- Technologies: Node.js, Express.js

- Features:

- RESTful APIs

- Authentication & Authorization

- JWT for session management

- bcrypt for password hashing

- Content management:

- CRUD operations for posts, comments, and likes

- Trending content logic (e.g., based on interactions)

- Notification service for real-time updates

4. \*\*Database Layer\*\*

- Technology: PostgreSQL or MongoDB

- Features:

- User data storage

- User profiles, hashed passwords, JWT tokens

- Content data storage

- Posts, comments, likes

- Trending metrics storage

- Interaction counts, timestamps

- Privacy controls

- User preferences and settings

5. \*\*Caching Layer (Performance Optimization)\*\*

- Technology: Redis or Memcached

- Features:

- Session caching for quick authentication

- Trending content pre-fetching for faster discovery

6. \*\*Media Storage\*\*

- Technology: AWS S3 or Cloudinary

- Features:

- Secure and scalable media storage for images/videos

- Pre-signed URLs for secure uploads/downloads

7. \*\*Real-Time Features\*\*

- Technology: WebSockets or Socket.io

- Features:

- Real-time updates for likes, comments, and notifications

- Live content updates in the user feed

8. \*\*Monitoring & Analytics\*\*

- Technology: AWS CloudWatch, Datadog, or Google Analytics

- Features:

- Track user engagement and app performance

- Monitor API usage and errors

9. \*\*Security Layer\*\*

- Features:

- HTTPS for secure data transfer

- Rate limiting to prevent abuse

- Regular vulnerability scans and updates

10. \*\*DevOps (Deployment & Scaling)\*\*

- Technologies: Docker, Kubernetes, AWS/GCP/Azure

- Features:

- Continuous Integration/Continuous Deployment (CI/CD)

- Auto-scaling to handle traffic spikes

- Load balancing for reliable performance

END

