System Dependencies – VXML IVR & Conversational AI Integration

# 1. Databases

Databases are central for storing and retrieving customer and business data when a user interacts with IVR.  
  
- Customer Data: Account details, balances, preferences.  
- Transaction Records: Payments, call history, service requests.  
- Authentication Data: PINs, security questions.  
  
Typical choices:  
- Relational Databases (Oracle, MySQL, SQL Server) → for structured data.  
- NoSQL Databases (MongoDB, Cassandra) → for session data, AI context.

# 2. CRM Systems

CRM (Customer Relationship Management) software provides customer profiles, history, and case management.  
  
Why needed in IVR: When a customer calls, IVR may need to fetch info like:  
- Current service requests.  
- Account status.  
- Previous interactions.  
  
Common CRMs: Salesforce, Microsoft Dynamics, Zoho CRM, custom-built CRMs.  
  
Integration Need: IVR/AI must query CRM APIs in real-time to personalize responses (e.g., “Hello, your bill is due on the 25th”).

# 3. Telephony Infrastructure

The foundation of IVR systems. Without this, no calls flow in/out.  
  
- PSTN (Public Switched Telephone Network): Traditional phone lines.  
- VoIP (Voice over IP): Internet-based calling, often used with modern AI platforms.  
- PBX (Private Branch Exchange): On-premise call routing system in enterprises.  
- SIP (Session Initiation Protocol): Standard protocol for initiating voice/video calls over IP.  
- Media Gateways: Convert PSTN ↔ VoIP.  
  
Old IVR (VXML): Typically works on top of telephony servers (Genesys, Avaya, Cisco, Asterisk).  
New AI platforms (ACS/BAP): Use cloud telephony & APIs (Twilio, Azure Communication Services, Amazon Connect).

# 4. Middleware / Integration Layer

To bridge Old IVR ↔ Modern AI systems:  
- API Gateways (REST, SOAP).  
- Message Brokers (Kafka, RabbitMQ).  
- Format Transformers (XML ↔ JSON).  
- Session Managers (to maintain conversation state).

# 5. High-Level Dependency Diagram

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 │ Database │  
 │ (Oracle/MySQL) │  
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 │  
 ┌──────────┐ │ ┌──────────────┐  
 │ CRM │◄─────┼─────►│ Conversational│  
 │ (Salesforce) │ │ AI (ACS/BAP)│  
 └──────────┘ └──────▲───────┘  
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 ┌────────┴────────┐  
 │ Integration Layer│  
 │ (API, Middleware)│  
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 │  
 ┌──────────────┴─────────────┐  
 │ Telephony Infrastructure │  
 │ (PSTN, SIP, PBX, VoIP) │  
 └──────────────┬─────────────┘  
 │  
 User Call

# 6. Summary

- Databases → Store structured customer + transaction data.  
- CRMs → Provide real-time customer insights to IVR/AI.  
- Telephony Infra → Manages call flow (PSTN, SIP, VoIP).  
- Middleware → Ensures old IVR (XML/DTMF) can communicate with modern AI (JSON/intents).