Human Interaction Container Paradigm

HIT Lab.

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Human Machine Interfaces (HMI) were designed to render applications or systems tracktable by the user, and it can be observed an increasing need on HMI that could provide assistance to the user in business execution. Such need leads to new approaches to HMI, that is model-based Human System Interaction that support
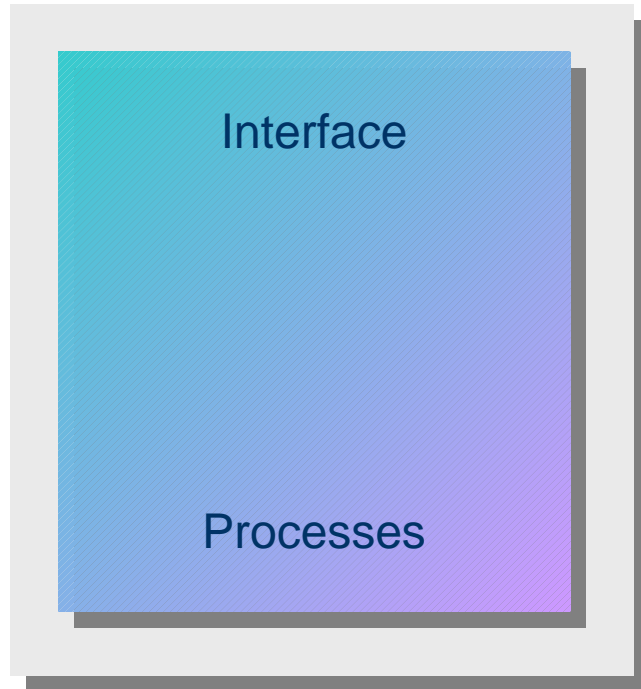
- **Objective**: investigate, develop, experiment and transfer the technology required for the next generation of intelligent user interfaces offering dynamic adaptation to user on one hand, and support model-driven approach for interaction engineering.

- **Solution**: Render the interaction logic explicit and independent from other logics (application/business logic and interface/presentation logic)

- **Main issues:**
  - Implement the separation between the various logics
  - Build models for the representation of the interaction context:
    - User (profile, preferences, role, task or mission, …)
    - Domain (application services, application state, business rules, …)
    - Devices (workstation PC, laptop PC, PDA, mobile phone, tablet PC, …)
  - Modalities (graphical, speech-based, gesture-based, …)
- Propose generic interaction processes that can be easily instantiated upon specific business domains
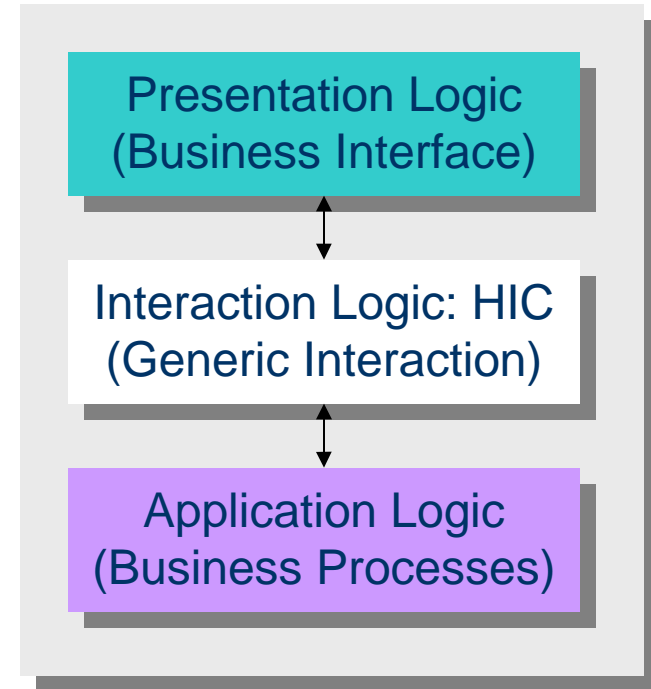
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Human Interaction Container Paradigm:

Dig-out Interaction from MMI, by splitting Interaction on one hand, and interaction rendering for human senses (vision, touch, etc.) on the other.

Current Systems

HIC-based Systems

Interface

Processes
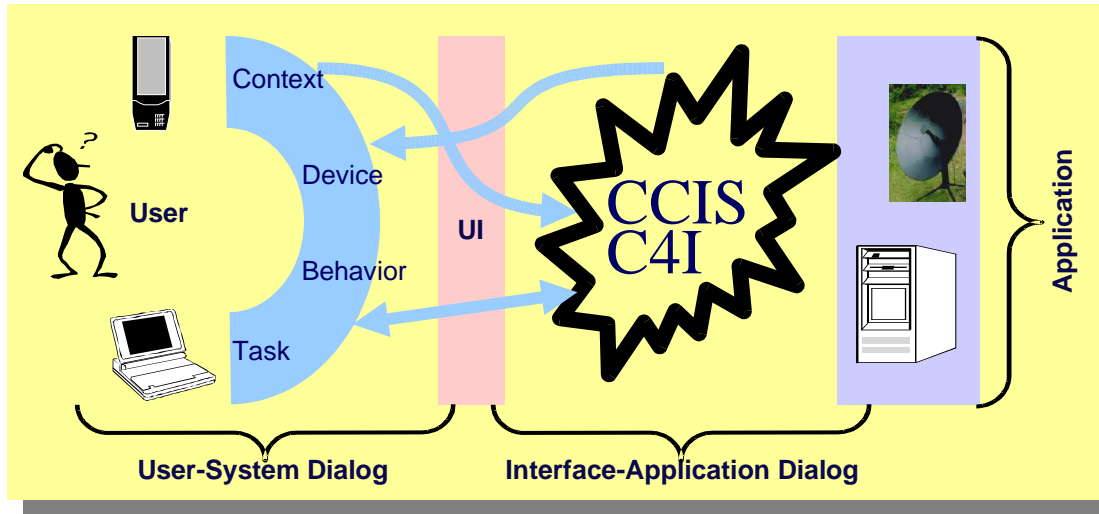
Presentation Logic (Business Interface)

↕

Interaction Logic: HIC (Generic Interaction)

↕

Application Logic (Business Processes)

Human Interaction Container Paradigm:

Embodying human as sub-system in the system

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A new paradigm of interaction

User

Context
Device
Behavior
Task

UI

CCIS C4I

Application

User-System Dialog   **Interface-Application Dialog**

Benefits

Business centered user interface

Redundancy of information

Adaptation to user profiles

The right information to the right person

Persistency of business performance

Plug and play devices

Team awareness

Services

🎧 **Dynamic interfaces**

    Selection of UI templates

       ★ **Static & dynamic GUI**

       ★ **Voice browsing**

    Adaptation to context

       ★ **Domain, task, user and device**

       ★ **History of interaction**

       ★ **Application state**

    Rendering by
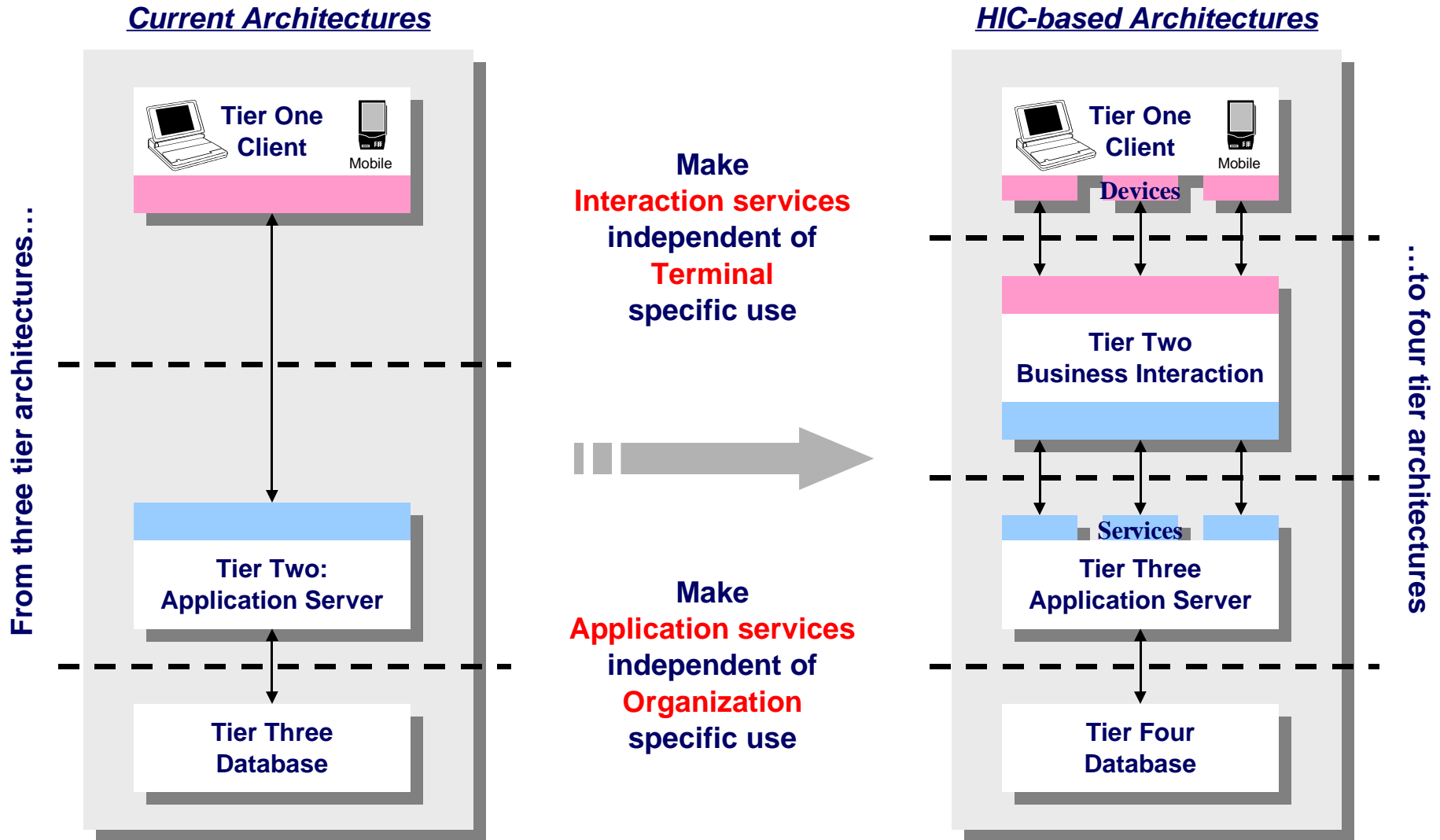
       ★ **Web browser**

       ★ **VoiceXML browser**

       ★ **GUI generator**

🎧 **Mobility over networks and devices**
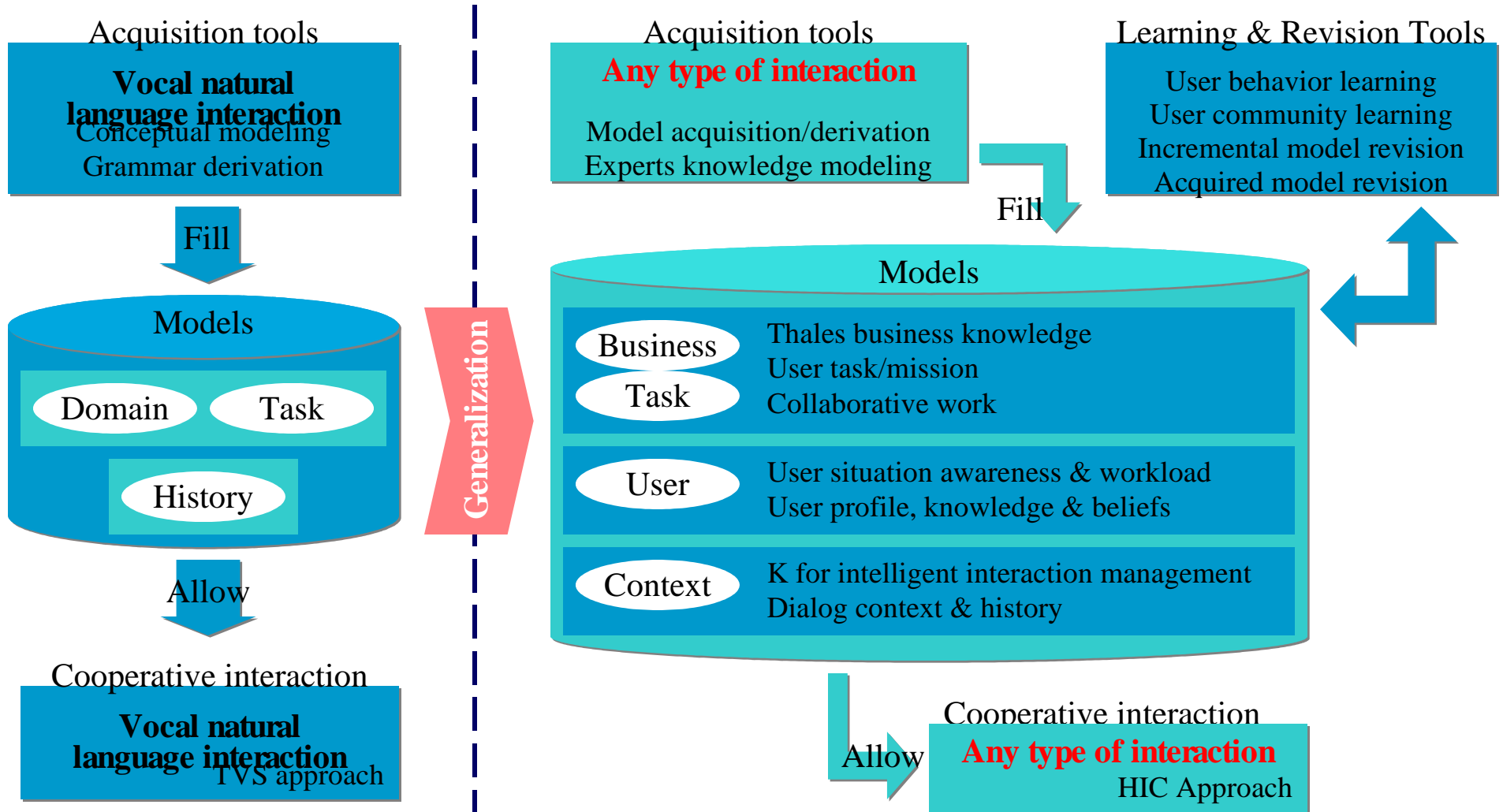
🎧 **Collaborative interaction: support to**

    Team communication

    Team coordination

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Current Architectures

HIC-based Architectures

From three tier architectures...

Tier One Client

Mobile

Tier Two: Application Server

Tier Three Database

Make
Interaction services
independent of
Terminal
specific use

Make
Application services
independent of
Organization
specific use

Tier One Client

Mobile

Devices

Tier Two Business Interaction

Services

Tier Three Application Server

Tier Four Database

...to four tier architectures

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Generalization of the context-based approach from vocal natural language interaction to any type of interaction

Acquisition tools
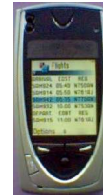**Vocal natural language interaction**
Conceptual modeling
Grammar derivation

Fill

Models

Domain   Task

History

Allow

Cooperative interaction
Vocal natural language interaction
TVS approach

Generalization

Acquisition tools
Any type of interaction

Model acquisition/derivation
Experts knowledge modeling

Fill

Learning & Revision Tools
User behavior learning
User community learning
Incremental model revision
Acquired model revision

Models

Business — Thales business knowledge
Task — User task/mission
Collaborative work

User — User situation awareness & workload
User profile, knowledge & beliefs

Context — K for intelligent interaction management
Dialog context & history

Allow

Cooperative interaction
Any type of interaction
HIC Approach

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Application Server

HIC Framework

Database

Audio HMI

Enhanced User Profile Management
Only the information the user needs (filtering & push)
"Adaptive" user model

Auto- Adaptation to User Terminal
Automatic HMI configuration
Automatic Data Filtering

"Workgroup" Messenger
Team Work modeling rule
Automatic Acronyms Translator
voice recognition/synthesis

XML Based Communication model
Platform-independent architecture
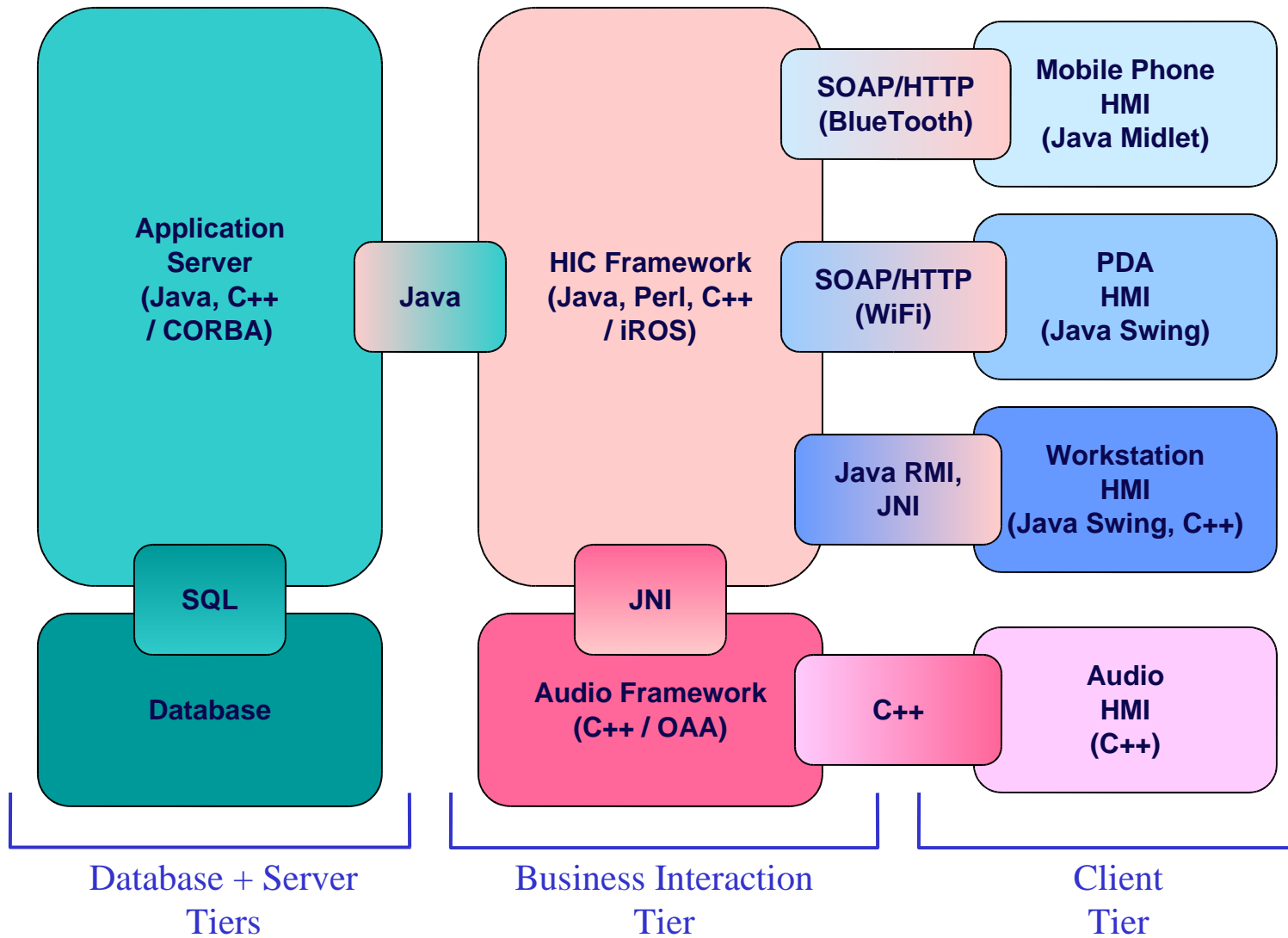**IP network compatibility**

Database + Server Tiers   Business Interaction Tier   Client Tier

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Application Server (Java, C++ / CORBA)

Java

HIC Framework (Java, Perl, C++ / iROS)

SOAP/HTTP (BlueTooth)

Mobile Phone HMI (Java Midlet)

SOAP/HTTP (WiFi)

PDA HMI (Java Swing)

Java RMI, JNI

Workstation HMI (Java Swing, C++)

SQL

JNI

Database

Audio Framework (C++ / OAA)

C++

Audio HMI (C++)

Database + Server Tiers

Business Interaction Tier

Client Tier

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Questions ?

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