

INTERNET BASED COMMUNICATION NETWORK BETWEEN DOCTORS

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Communication & Coordination Problems Between Doctors

- Coordination problems among health professionals treating the same patient can occur due to the lack of proper communication methods and technologies.

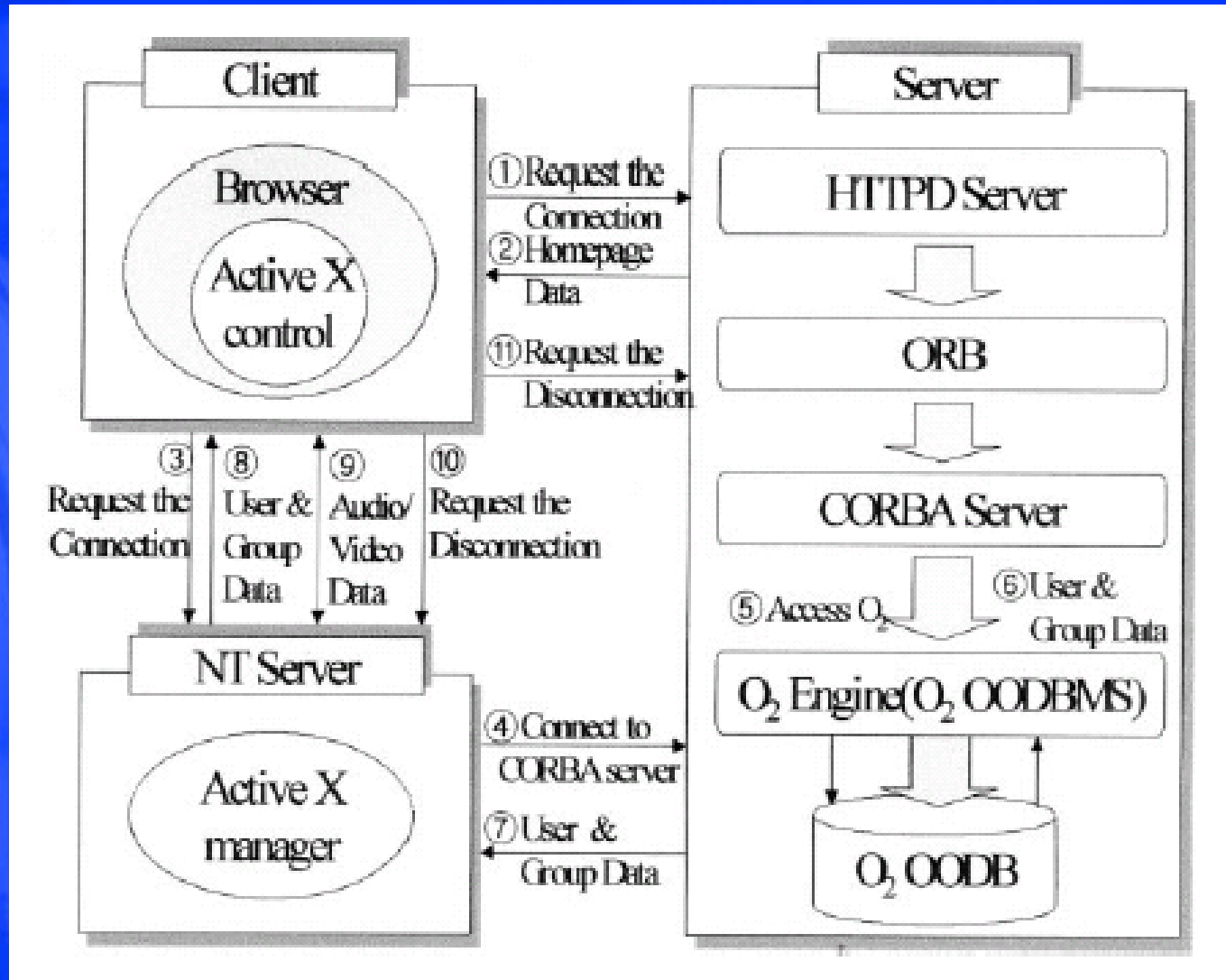
Coordination Problems Result:

- Repeat investigations and medication errors:
- According to a study by PJ. Branger, up to 13 per cent of laboratory tests are repeated due to lack of coordination or lost results
- The Institute of Medicine in the USA has reported similar findings. Price et. al. has found that up to 70 per cent of jointly treated patients may use more medication than necessary

What others did?

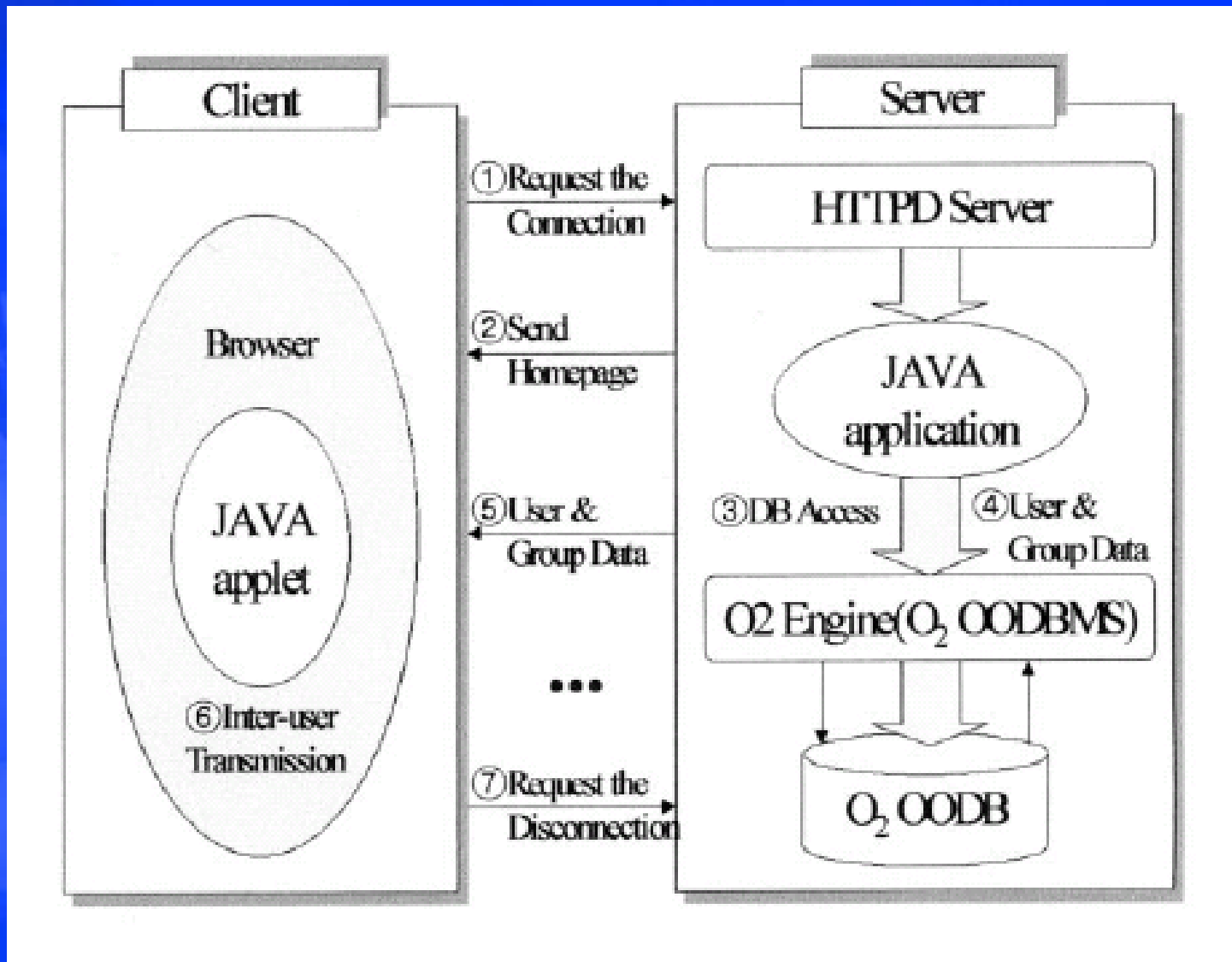
- Telemed, Medfast, MedNet, Bermed.
- CoMED, a real-time collaborative medicine system that allows medical specialists to share patient records and to communicate with each other on the Internet.

CoMED




Structure of the teleconferencing system

CoMED



Structure of the whiteboard and chatting system.

Example of Collaboration



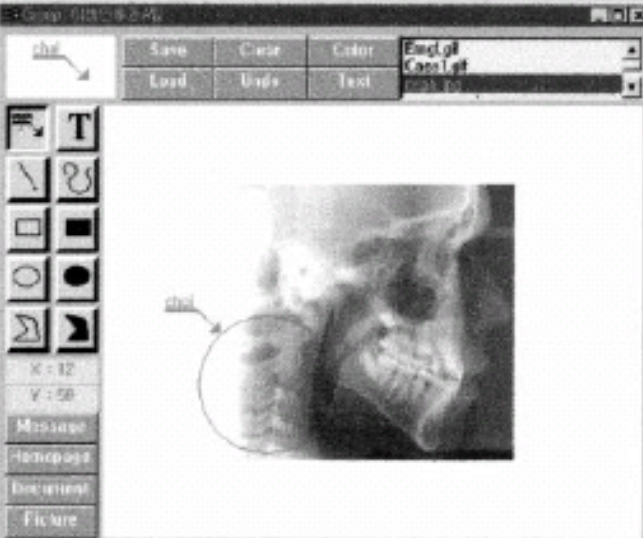
Collab

Patient ID

Name	김동석	<input checked="" type="radio"/> Male <input type="radio"/> Female	33	age	
Chart No.	1209834 - 0	Social Security Number	670987	-	1098123
Address	인천시 남구 도화동		D:슈프로젝트 찾아보기...		

Group: MACH2.AG

File menu: Save, Clear, Color, Empl, Copy, Load, Undo, Text




Message, Homepage, Document, Picture

Chat (BRINS): All chat(BRINS) entered All
 User (S.JACKY): All tomee(S.JACKY) entered All

Chatting Field:


preview



Server: Server Option About

Current User

Users	Address	tomae



Exit Current User Static Static

Connected to Server

Site Code

- OC ...ORAL CAVITY
- OCB Buccal zone
- OCAL Alveolar ridge, Lower
- OCALU Alveolar ridge, Upper
- OCBL Retromolar trigone
- OCSE Floor of mouth
- OCH Hard palate
- OCU Oral tongue/ant, 2/3
- OD ...ORAL CAVITY
- ODL Ant. wall/tongue

Our Goal

- It is clear that there is a need to improve the coordination of care and to improve the quality of communication.
- To become successful in improving quality health care, we must obtain timely and accurate flow of medical information among physicians treating the same patient.
- The key point in this project is to obtain online communication network between physicians.

Our Approach

- We can not deny that the era we are living in is now called “the age of communication”
- We have to get most out of benefits of communication.

Our Approach

- The general goal of using communication technologies in medical environments is to improve the overall quality of healthcare at an affordable cost.
- First of all, we need to set up a secure online communication system between doctors in order to reach our goal.
- Design and implement a database system to fulfill the requirements of a computer-based patient tracking system

Choosing an appropriate software development tool

- In this study, first of all, in order to provide a communication network solution between doctors, a platform independent solution(Java) was taken into consideration.

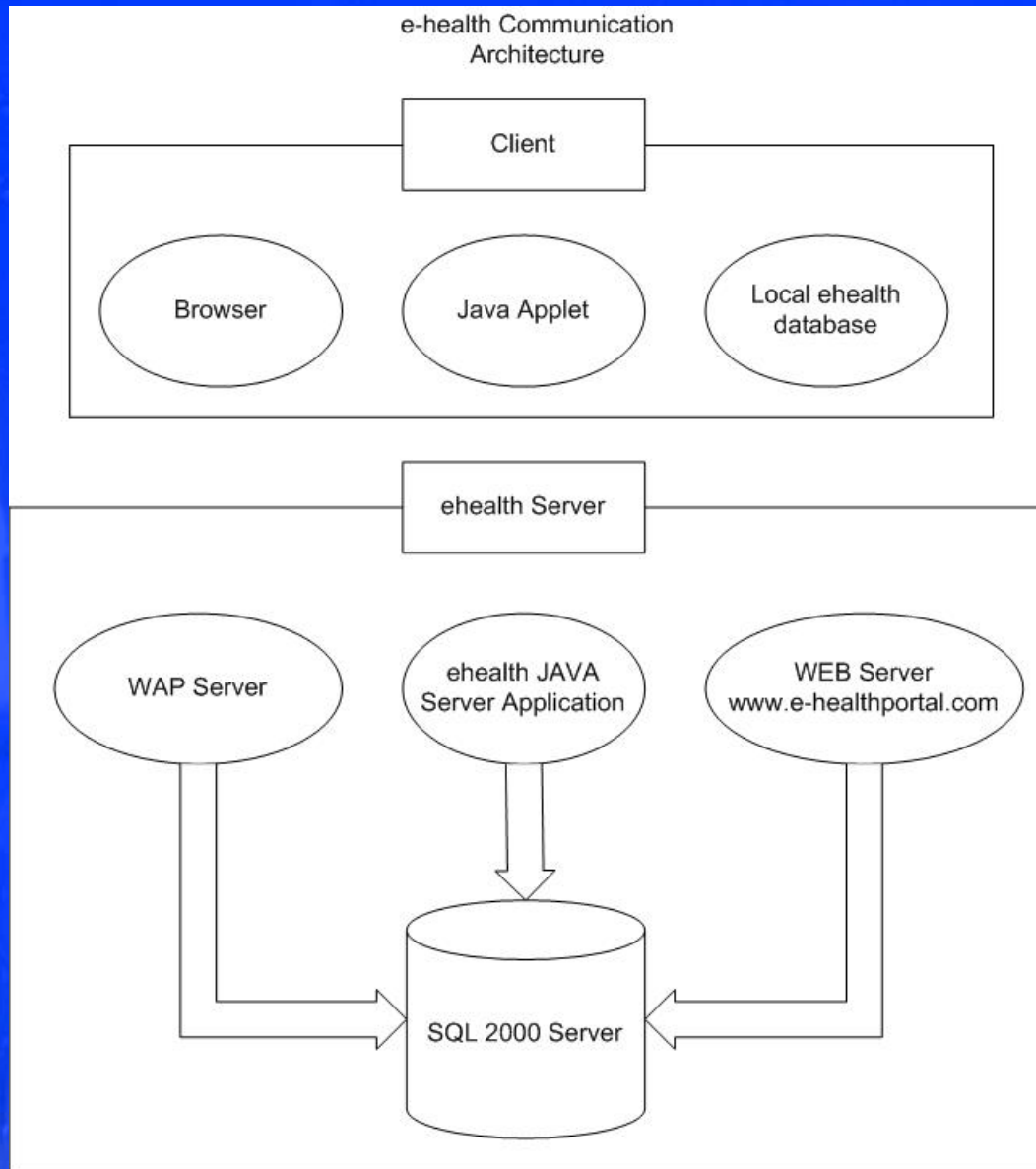
Java

- The Java language offers a unique option to be able to recreate programs that run as a “stand-alone” application or as applets that are dependent on a controlling program such as a Web browser. The big difference between applications and applets is that applications contain enough code to work on their own and applets need a controlling program to tell the applet when to do what.

Applets

- Applets cannot read or write to files on an end user's hard drive.
- Applets are only allowed to communicate with the server from which they were downloaded

Our Network Solution Named “ehealth”

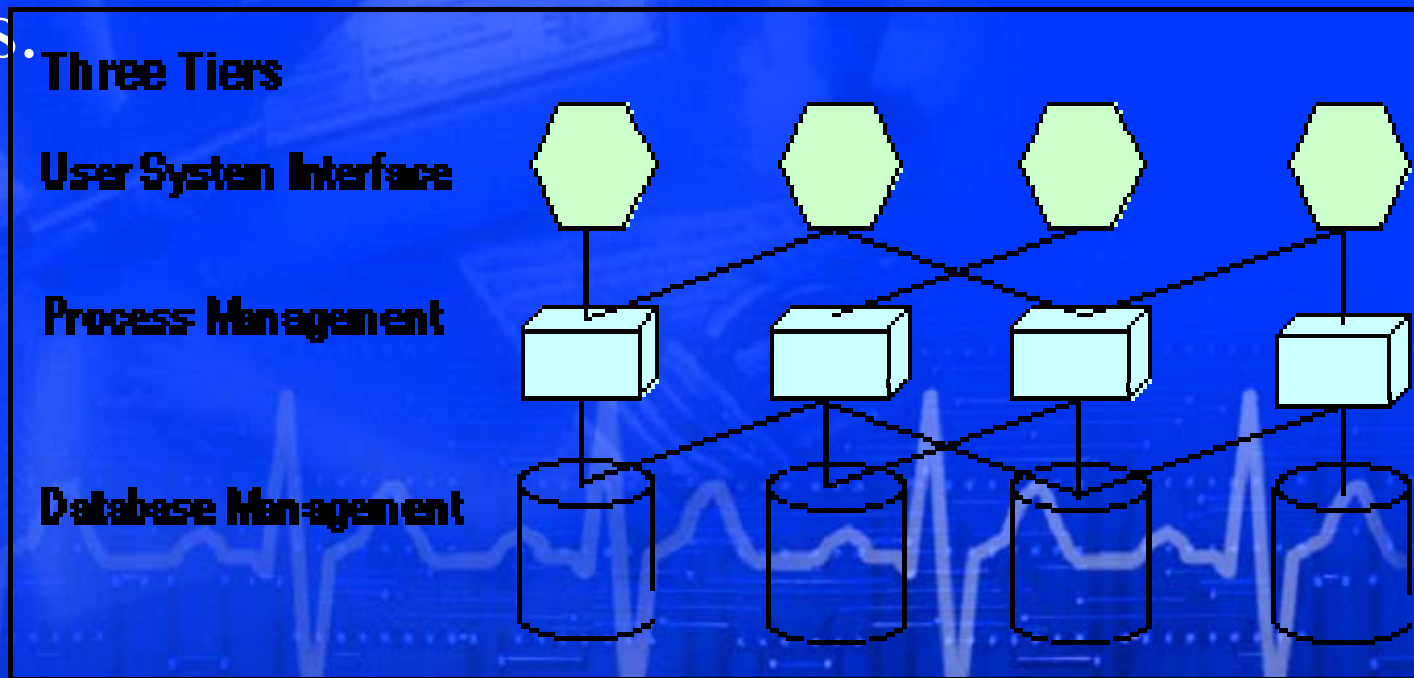


Three Tier Software Architectures

- The three tier architecture is used when an effective distributed client/server design is needed that provides (when compared to the two tier) increased performance, flexibility, maintainability, reusability, and scalability, while hiding the complexity of distributed processing from the user.

Three Tier Software Architectures

- These characteristics have made three layer architectures a popular choice for Internet applications and net-centric information systems.



3 tiered ehealth communications system

- Ehealth system contains a 3 tier software architecture. SQL Server 2000 1st tier, Communication Manager Server Application 2nd tier and finally Communication Manager Applet 3rd tier.

Development Phase of ehealth Communication Manager

The screenshot shows the JBuilder IDE interface. The title bar reads "JBuilder - C:/sil/thesis/client2/ehealthWindow.java". The menu bar includes File, Edit, Search, View, Project, Run, Team, Wizards, Tools, Window, and Help. The toolbar contains various icons for file operations and development tools. The left pane shows a project tree for "ehealthproject.jpr" with a list of Java files, including "ehealthWindow.java" which is selected. Below the project tree is an "Imports" pane showing "ehealthWindow" with sub-items "Frame" and "ActionListener". The main editor window displays the source code for "ehealthWindow.java". The code includes comments for "ehealth Chat" and "Copyright (C) 2002 A. Erol Fazlioglu", followed by several import statements for AWT, Swing, and Network classes. The main class is "ehealthWindow", which extends "Frame" and implements "ActionListener", "ItemListener", "KeyListener", "MouseListener", "WindowListener", and "ClipboardOwner". The class contains several public fields for id, name, passwords, host, port, and portNumber. At the bottom of the IDE, there is a console window showing the command "1\lib\htmlconverter.jar;F:\JBuilder6\jdk1.3.1\lib\tools.jar" and the output "ehealthServer". The status bar at the bottom indicates "Build succeeded. Build took 208 seconds." and the taskbar shows "JBuilder - C:/sil/thesis..." and "ehealth Chat v2.01 Server".

```
// ehealth Chat
// Copyright (C) 2002 A. Erol Fazlioglu
//
// ehealthWindow.java
//

import java.awt.*;
import java.awt.event.*;
import javax.swing.ImageIcon;
import java.awt.datatransfer.*;
import java.io.*;
import java.net.*;

public class ehealthWindow
    extends Frame
    implements ActionListener, ItemListener, KeyListener, MouseListener,
        WindowListener, ClipboardOwner
{
    public int id = 0;
    public String name = "";
    public String plainPassword = "";
    public String encryptedPassword = "";
    public String host = "localhost";
    public String port = "12468";
    public int portNumber = 12468;
}
```

Ehealth project consists of

- Over 5000 lines of Java Codes
- 24 standalone Java Files
- Local Access Database file
- SQL Server 2000 Server Database

ehealth Communication Manager

- The software is formed of two parts, Client and Server parts

Server side of the Communication Manager

ehealth Chat v2.01 Server

Listening on port 12468

Log chat(s)

User management

Administrator client

Disconnect user

Disconnect all


Shut down

Erol
Administrator

Connections - current: 2 peak: 2 total: 3

Server activity log:

Reading message file
Waiting for connections
New user Administrator logging on at Haz 17, 2002 03:53 PM from 127.0.0.1
There are 1 users connected
User Administrator disconnected at Haz 17, 2002 03:53 PM
There are 0 users connected
New user Erol logging on at Haz 17, 2002 03:55 PM from 192.168.0.2
There are 1 users connected
New user Administrator logging on at Haz 17, 2002 03:55 PM from 127.0.0.1
There are 2 users connected



Client side of the Communication Manager

ehealth Chat v2.01 - online at localhost

File Edit Actions View Help

Text lines to send: User name: Administrator

Conference text: Current activity:

drawing will be much faster and smoother. Check out the new instant messaging and chat room features! Please send bug reports to bugreports@e-healthportal.com

There is 1 other user online

<<paging all conference participants>>
<<Erol is paging you>>
<<Erol is paging you>>
Administrator> This is a breast image taken from our patient.
Erol> What is inside of the circle?
Administrator> Tumour!!
Erol> The patient has a breast cancer.

Currently sending to: Erol

send to everyone!

User information

Page user(s)

Chat rooms...

Messaging...

Drawing canvas: Drawing controls:

Online Consultation

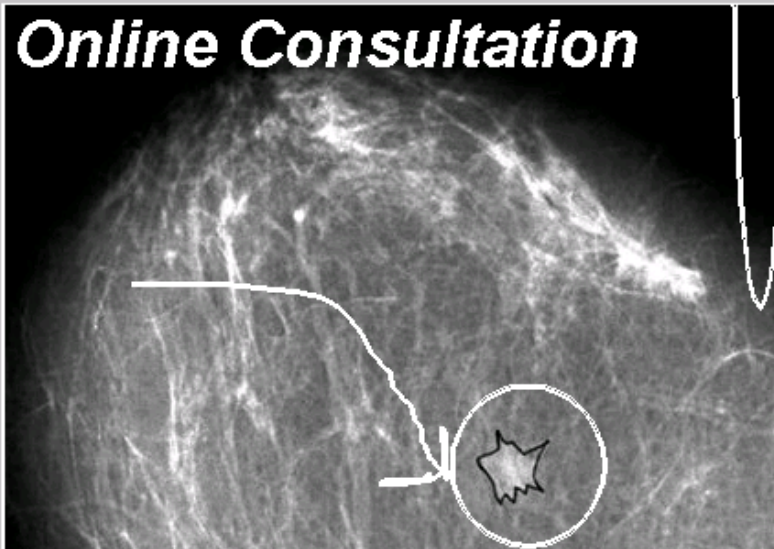
Freehand Line
 Rectangle Oval
 Text

white

thickness: 3

outlined

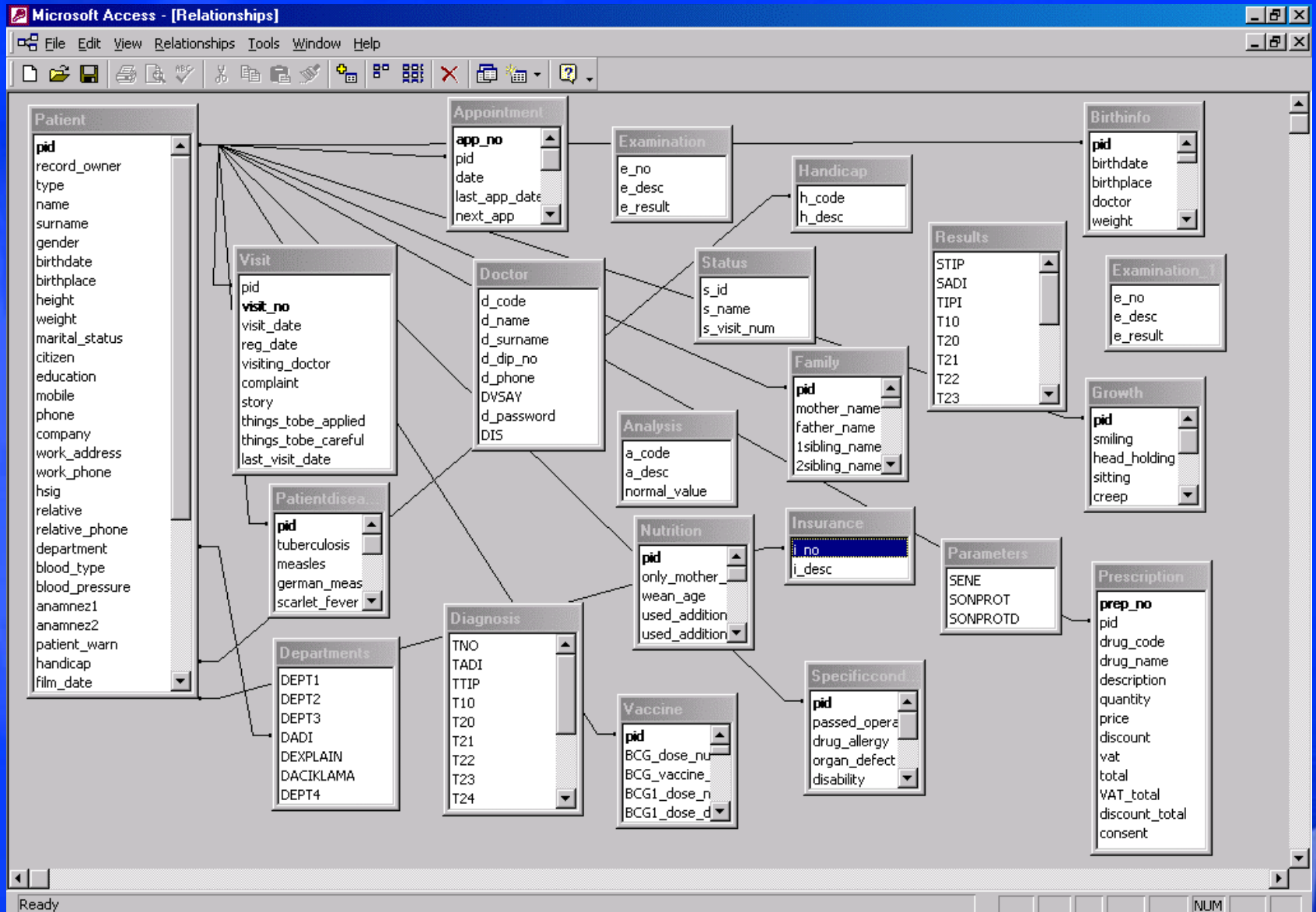
Clear canvas



Let us try?

- <http://www.e-healthportal.com/comm>

Local Database Structure in ehealth



Server Database Structure in ehealth

The screenshot displays the SQL Server Enterprise Manager interface. The left pane shows the tree view of the server structure, with the 'ehealth' database selected. The right pane shows a list of 32 tables, including user tables and system tables.

Name	Owner	Type
Analysis	dbo	User
Departments	dbo	User
Diagnosis	dbo	User
Doctor	dbo	User
Examination	dbo	User
Handicap	dbo	User
Insurance	dbo	User
Parameters	dbo	User
Patient	dbo	User
Results	dbo	User
Status	dbo	User
Visit	dbo	User
dtproperties	dbo	System
syscolumns	dbo	System
syscomments	dbo	System
sysdepends	dbo	System
sysfilegroups	dbo	System
sysfiles	dbo	System
sysfiles1	dbo	System
sysforeignkeys	dbo	System
sysfulltextcatalogs	dbo	System
sysfulltextnotify	dbo	System
sysindexes	dbo	System
sysindexkeys	dbo	System
sysmembers	dbo	System

ehealth Patient Tracking System

ehealth Patient

File Help

Patient Demographic Data Patient Visits Patient Appointments Patient Prescriptions Patient Record Communication Manager

Patient Diseases Patient Vaccine Info Patient Specific Conditions

Patient ID: 1 Entered Date: 05.09.1989 Company: []

Name: ZEHLIYA Find: pid [] Work Phone: []

Surname: GUNCER Record Owner: Dr. Mehmet Work Address: []

Birthdate: 17.04.1960 Birthplace: Mardin Home Address: []

Height: 1.65 Weight: 57 Home Address: []

Gender: F Marital Status: Single Home Address 1: []

Citizen: TC Social Security: E Explanation: []

Blood Type: A RH+ Blood Pressure: NORMAL

Education: Master

Home Phone: 212 232 32 42 Mobile: 535 456 45 45

Relative: Erden Saglam Relative Phone: 532 345 45 68

Family Info Family Health Info Family Birth Info Patient Nutrition Info Patient Growth Info

Record 1 of 26

ehealth Communication Manager v1.09 - online at e-he...
File Edit Actions View Help Patient Records

Text lines to send: [] User name: Dr. Ersan Yüce

Conference text: [] Current activity: []

Currently sending to: Dr. Ahmet Keskin

send to everyone

User information

Page user(s)

Chat rooms...

Messaging...

ehealth Patient Record Communication Manager

The screenshot shows a software window titled "ehealth Patient" with a menu bar containing "File" and "Help". Below the menu bar is a tabbed interface with five tabs: "Patient Demographic Data", "Patient Visits", "Patient Appointments", "Patient Prescriptions", and "Patient Record Communication Manager". The "Patient Record Communication Manager" tab is active and displays a list of data categories, each with an unchecked checkbox:

- Patient Demographic Data
- Patient Family Info
- Patient Family Health Info
- Family Birth Info
- Patient Nutrition Info
- Patient Growth Info
- Patient Diseases
- Patient Vaccine Info
- Patient Specific Conditions
- Patient Visits
- Patient Appointments
- Patient Prescriptions

At the bottom of the list, there is a checkbox for "Send patient records to central ehealth database server." Below this is a button labeled "Send Selected Data to Active Room's Participants".

- My Documents
- My Computer
- My Network Places
- Recycle Bin
- Internet Explorer
- Shortcut to WINCMD32
- Vergi İadesi1.5.03
- Yadyok CDs
- Remote Control

ehealth Patient

File Help

Patient Demographic Data | Patient Visits | Patient Appointments | Patient Prescriptions | Patient Record Communication Manager

Patient ID **Entered Date** **Company**
Name **Find**
Surname **Record Owner** **Work Phone**
Birthdate **Birthplace** **Work Address**
Height **Weight**
Gender **Marital S**
Citizen **Social S**
Blood Type **Blood Pr**

Education
Home Phone **Mobile** **Explanation**
Relative **Relative Phone**

Editing row

New Patient Record received from Dr. Ahmet Keskin

New Patient Record received from Dr. Ahmet Keskin

ehealth Communication Manager v1.09 - onli...

File Edit Actions View Help Patient Records

Text lines to send:

User name:

Current activity:

Conference text:

Currently sending to:

send to everyone

Exchanging Patient Records

```
<?xml version="1.0" encoding="UTF-8"?>  
<!ELEMENT Patient (name, surname, gender, birthdate,  
birthplace, height, weight, marital_status, citizen,  
education, mobile, phone, company, work_address,  
work_phone, hsig, relative, relative_phone, department,  
blood_type, blood_pressure, anamnez1, anamnez2,  
patient_warn, handicap, film_date, film_open,  
entered_date, last_reg_date, address1, address2,  
explanation, social_security)>  
<!ELEMENT address1 (#PCDATA)>
```

MyHealth Record Login Screen

The screenshot shows a web browser window titled "e-healthportal.com - MyHealthRecord - Members Login - Microsoft Internet Explorer". The address bar contains "http://www.e-healthportal.com/web/memlogin/signin/loginn.asp". The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The toolbar shows navigation buttons (Back, Forward, Stop, Home, Search), Favorites, Media, and other utility icons. The address bar has a "Go" button. Below the address bar, there are links for "Garanti", "Akbank", "e-health", "e-health COMM", "Erol", "Silikonet", "MIS", "MIS Erol", "Hadibakalim", and "Google". A search bar is present with a "Search" button and a dropdown menu. The main content area features the "e-healthportal.com" logo on the left and a banner for "Premier Hospital" on the right. Below the banner is a navigation menu with links for "Home", "MyHealthRecord", "Diseases & Conditions", "Emergency Center", and "About Us". On the right side of the page, there is a "Total Members:" counter showing "1111". The main heading is "MyHealthRecord". Below this heading is a "Signin" form with a "User Id" field containing "9340053" and a "Password" field with an asterisk. A yellow "Sign In" button is below the password field, along with a link for "Forgot my password!". At the bottom of the form is a link for "New User? Sign-up here!". To the right of the form is a circular image of a stethoscope on a stack of papers. Below the image is a paragraph of text: "Please read our [Terms & Conditions](#) and [Privacy Policy](#) carefully before logging in to e-healthportal practice. Indicate your acceptance of the Terms of Use by clicking the 'Login' button." Below this is another paragraph: "If you do not agree to all the terms of this agreement, please [quit](#) and do not access or use e-healthportal.com's services." The browser's status bar at the bottom shows "Internet".

e-healthportal.com Premier Hospital

Home | MyHealthRecord | Diseases & Conditions | Emergency Center | About Us

Total Members: 1111

MyHealthRecord

>>Signin


User Id

Password

[Sign In](#)

[Forgot my password!](#)

[New User? Sign-up here!](#)



Please read our [Terms & Conditions](#) and [Privacy Policy](#) carefully before logging in to e-healthportal practice. Indicate your acceptance of the Terms of Use by clicking the "Login" button.

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MyHealth Record Screen

e-healthportal.com - MyHealthRecord - Members Login - Microsoft Internet Explorer



File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Copy Paste Refresh

Home | MyHealthRecord | Diseases & Conditions | Emergency Center | About Us

MyHealthRecord

Name	GOKHAN
Surname	GUNCER
Type	20
Gender	M
Birthdate	17.04.1971
Phone	(212) 345 45 45
Blood Type	B RH+
Blood Pressure	HIGH
Entered Date	05.09.1989
Last Reg. Date	05.09.1994
Address	Atilay Sok. Saral Apt. No:17/5 81040 Feneryolu - Istanbul
Social Security	H



[Update Your Demographic Data?](#)

My Visits

Date	Diagnose	Doctor	Note1	Note2
01.03.1994	KULAK-BURUN-BODAZ	SUNA SAYAR	BURUN DAMLASI VERILECEK	

Done Internet

Results

- A Platform independent communication network has been established between doctors
- The use of Internet allows us to further reduce the communication costs for long distances.
- Ehealth communication manager is a unique tool for teleconsultation purposes.

Results

- Dr. Cemil Uca, the one of four partners of Söğütlüçeşme Polikliniği in Sefaköy, use ehealth communication manager in order to communicate and teleconsultate with partners and one medical imaging laboratory.

Near Future Work

- Keeping the content of www.e-healthportal.com up to date.
- Developing www.e-healthportal.com/wap WAP site in order to enable patients reach their medical data using their mobile phones.

Far Future Work on “ehealth”

- Adding voice conversation functionality to ehealth communication manager.
- Adding net meeting functionality in order to obtain a real-time video communications.
- Integrate ehealth project with PDA(personal digital assistant)’s.

Thanks for your attention!

- Any questions?

- A. Erol Fazlıoğlu