De-centralized network system for sharing electronic medical records

Shinji KOBAYASHI
CHIHAYA Hospital

Introduction

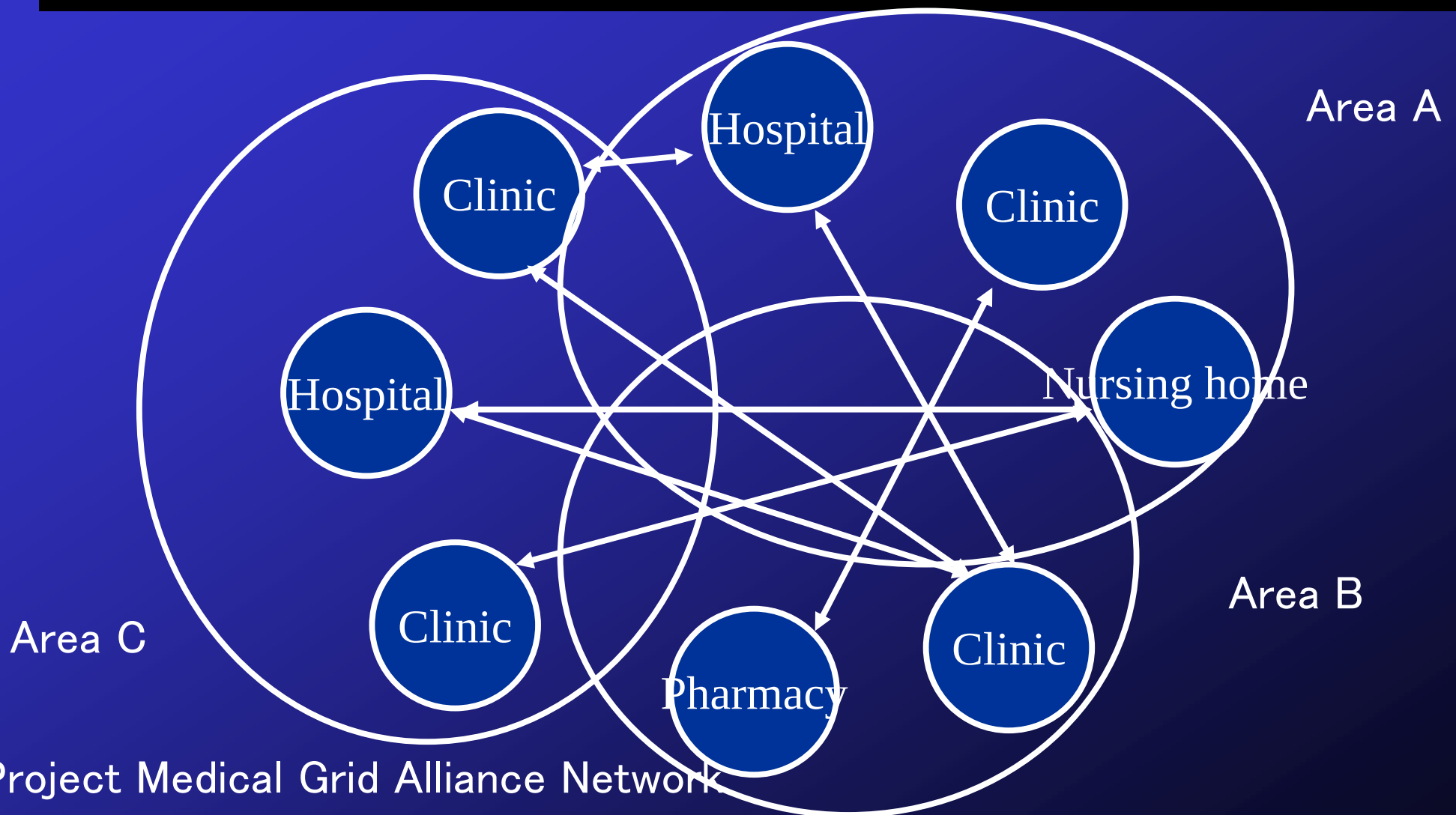
- Inter-hospital relationship
  - Specialty, intensive care, collaboration
- Share electronic health/medical records
  - Regional Healthcare Information Organization
  - EHR
- Is centralized model(Client/Server) suitable?

Regional Healthcare Information Organization(C/S type)

Problem of C/S model

- Mismatch of relationship
  - Relationship is not only limited in organization, but also spread in mutual trust.
- Compatibility among systems
  - Incompatible format
  - Closed architecture
- Administration cost
  - Server, security, software, line
  - How it cost? Is it sustainable?

De-centralized model



Project Medical Grid Alliance Network

Methods

- Development environment

  Java2 SDK 1.4.2, JXTA 2.1, Eclipse 3.2.1, CVS for source code repository
- Software design
  - –Divided three modules, Referral letter editor module, Message management module, P2P communication module
  - –Referral letter editor
    - GUI editor for referral letter
  - –Message management
    - Message saved as Java instance
  - –P2P communication module
    - Search and manage participant healthcare provider by JXTA Framework 2.1, which is open source P2P framework.

Result

- Development

  Total 8547 line, 3packages, 49 classes.
- Software deployment

  Takes about 5 minutes
- Encrypted P2P communication
  - Transfer referral letters to each participant via encrypted pipe, by P2P technology
- Open source
  - We issued software repository on Sourceforge.jp.

  http://cvs.sourceforge.jp/cgi-bin/viewcvs.cgi/mega-net/

Screen snapshots

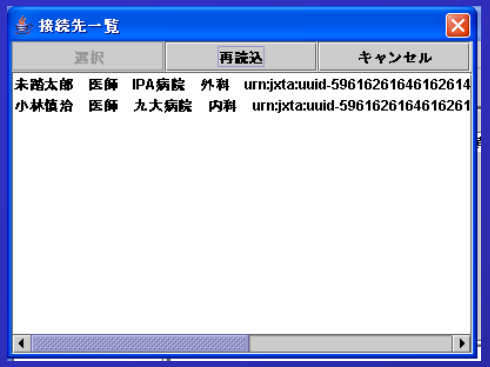


Figure 1. List of healthcare providers

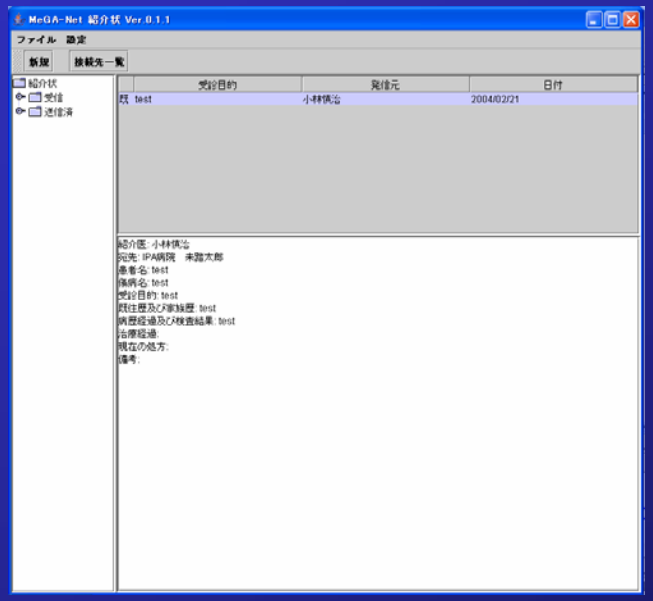


Figure 2. Referral letter management window

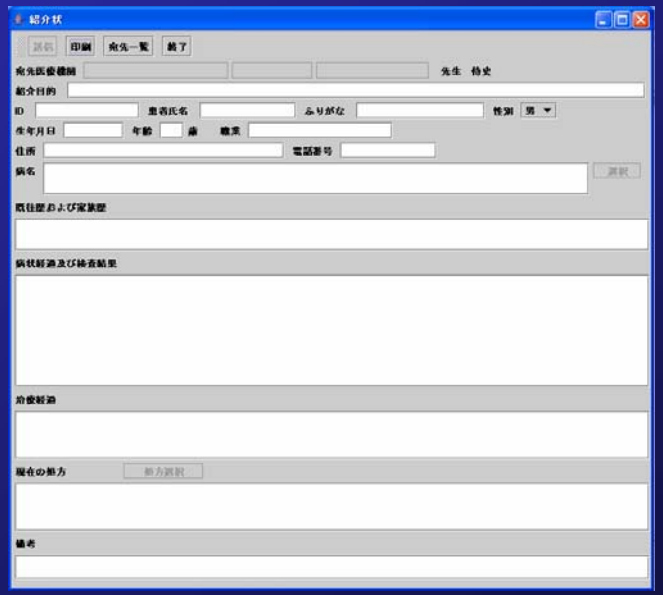


Figure 3. Referral letter editor window

Discussion 1

- Robustness
  - Peer-to-peer communication does not depend on a specified network route, but on duplicated route.
  - Attacker cannot crack entire network. される。
- Information leakage
  - Information is encrypted and transferred directly to each other to protect leakage by the third party
- Authentication
  - JXTA PSE(Personal Security Environment) authentication system implements PKI based authentication.

Discussion 2

- Cost
  - Reduced development cost by using open source software
- Deployment
  - No server setup, client setup only

Model	Development cost	Server maintenance cost	Client maintenance cost
De-centralized	$60,000	$0	$0
Centralized	$2,000,000	>$100,000/year	>$1,000/year

Conclusion

- We have preliminary developed a de-centralized collaboration system.
- As compared to other systems, our system has fewer restrictions, is inexpensive, and can be used to construct a robust network.
- This system has the capability to enrich medical practice but has been faced to the legal issue.

Acknowledgement

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