

# Organizing Service-Oriented Peer Collaborations

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# Talk Overview

- Introduce the “notion” of communities
- Types of Communities
- Interaction between Community participants
- A JXTA Prototype
- Conclusion
- Questions and Suggestions

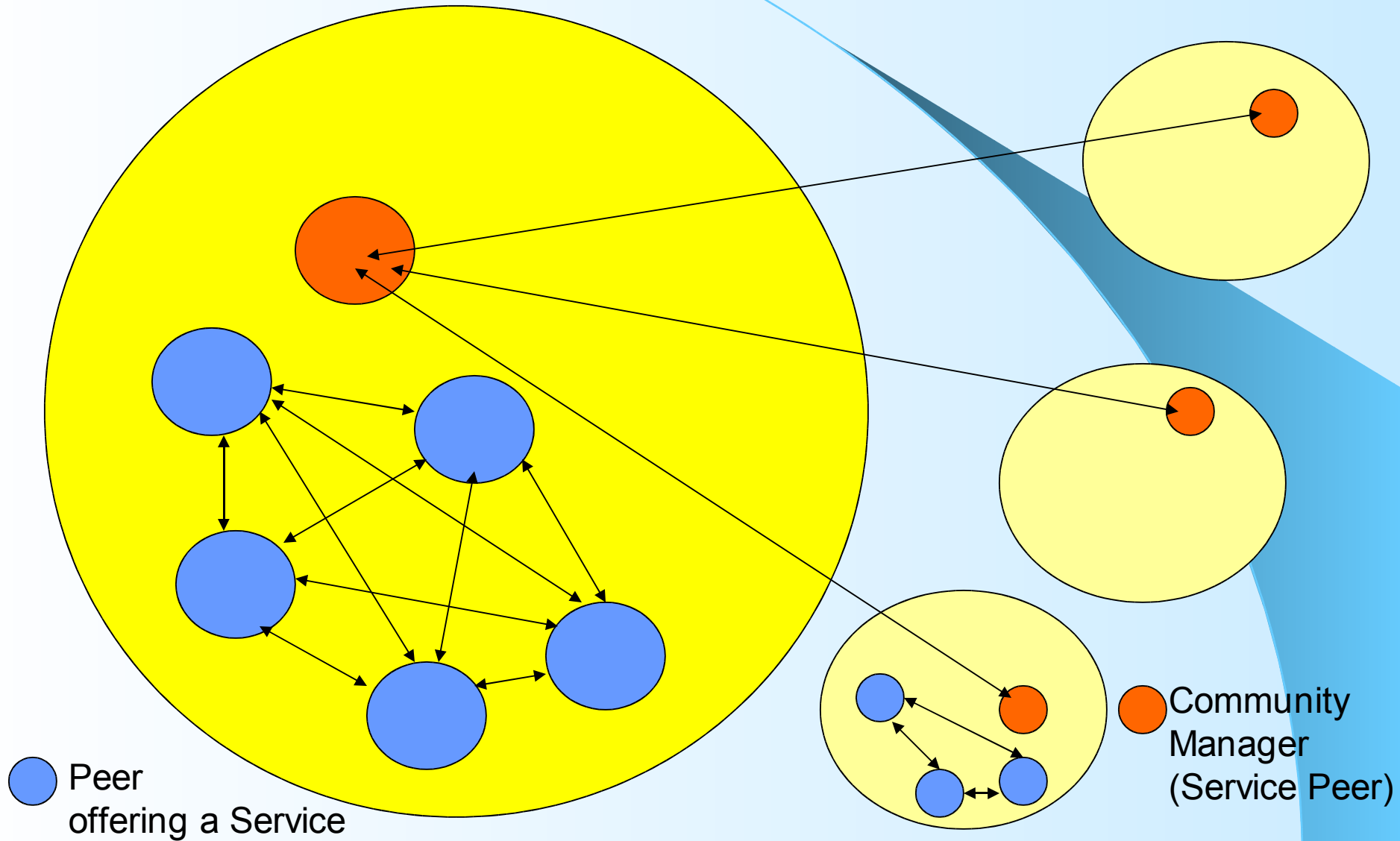
# Electronic Communities

- Many current distributed technologies provide support for “communities”
  - Scientific Communities (eg: Grid Computing)
  - Example: **DZero** experiment in Physics (involves 100s of Physicists in 18 countries)
  - Example: Music Sharing Communities (Peer-2-Peer based): **KaZaA**, **JXTA**,etc
- Interest specific Communities
  - Example: **YahooGroups**
  - Example: **sourceforge.net** (open source community)

# Discussion Points

- Why communities are desired?
- How they are formed?
- How communities work and interact?
- What are different possible types of communities and their overall behaviour?
- What are the advantages of community formation?
- How communities are adaptive in nature?

# Community Structure



# Community Structure

- Management Services
  - ⊕ Discovery and Membership
  - ⊕ Peer Rating
  - ⊕ Community Rating
  - ⊕ Information Sharing
  - ⊕ Learning and Adaptivity
- A Peer may belong to multiple Communities
- Hierarchical Communities
  - ⊕ A Community may have sub-communities

# What are Communities

- Peers expertise or interest in each other's expertise form communities.

- Expertise: Core services
  - Service(s) being offered by a Peer
- Interests: Utility services
  - Service(s) needed by a Peer to allow Core Services to run

# Community Formation

- Service Peer (“Community Manager”)
  - ⊕ Is necessary for a community to exist, and provides management services
  - ⊕ may also offer specialist services
  - ⊕ A new peer first tries to discover the Service Peer which may have interest in its capabilities/services
  - ⊕ Manages all peers within its community
- Service Peer and all peers registered with it constitute a community.
- Communities interact with each other via their Service Peers



# Type of Communities

- Competing Community
- Co-Operative Community
- Goal Oriented Community
- Ad Hoc Community
- Domain-Oriented Community

# Competing Community

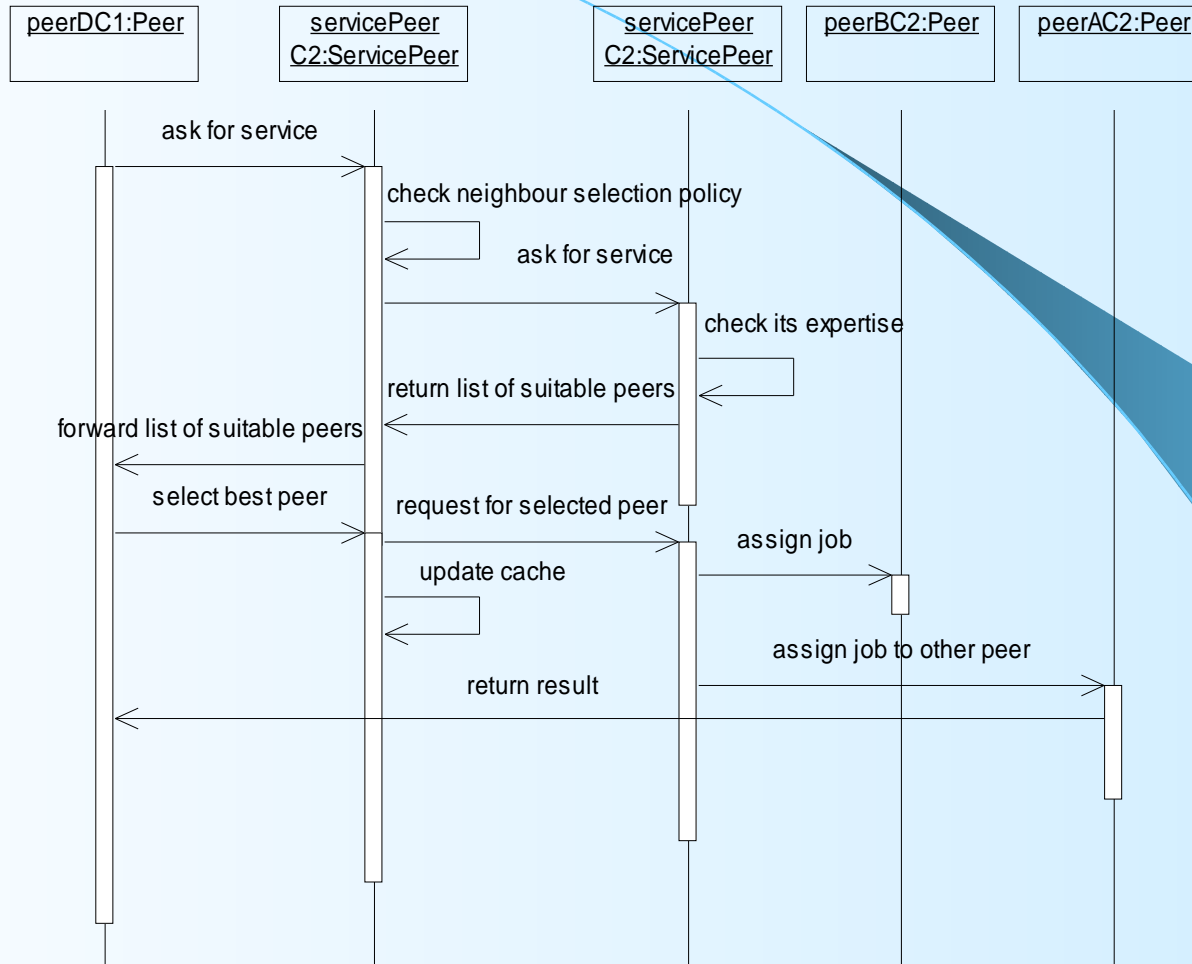
- ⊕ Each Peer has the same expertise
- ⊕ Peers may have different service attributes
- ⊕ Member Peers compete each other to perform a job
- ⊕ Competition is mainly for service attributes which are not shared by Peers
- ⊕ Competition results in improved quality of services within the community
- ⊕ Competing Community may have two types of Service Peers

*Service-Oriented Peer*

*Non Service-Oriented Peer*

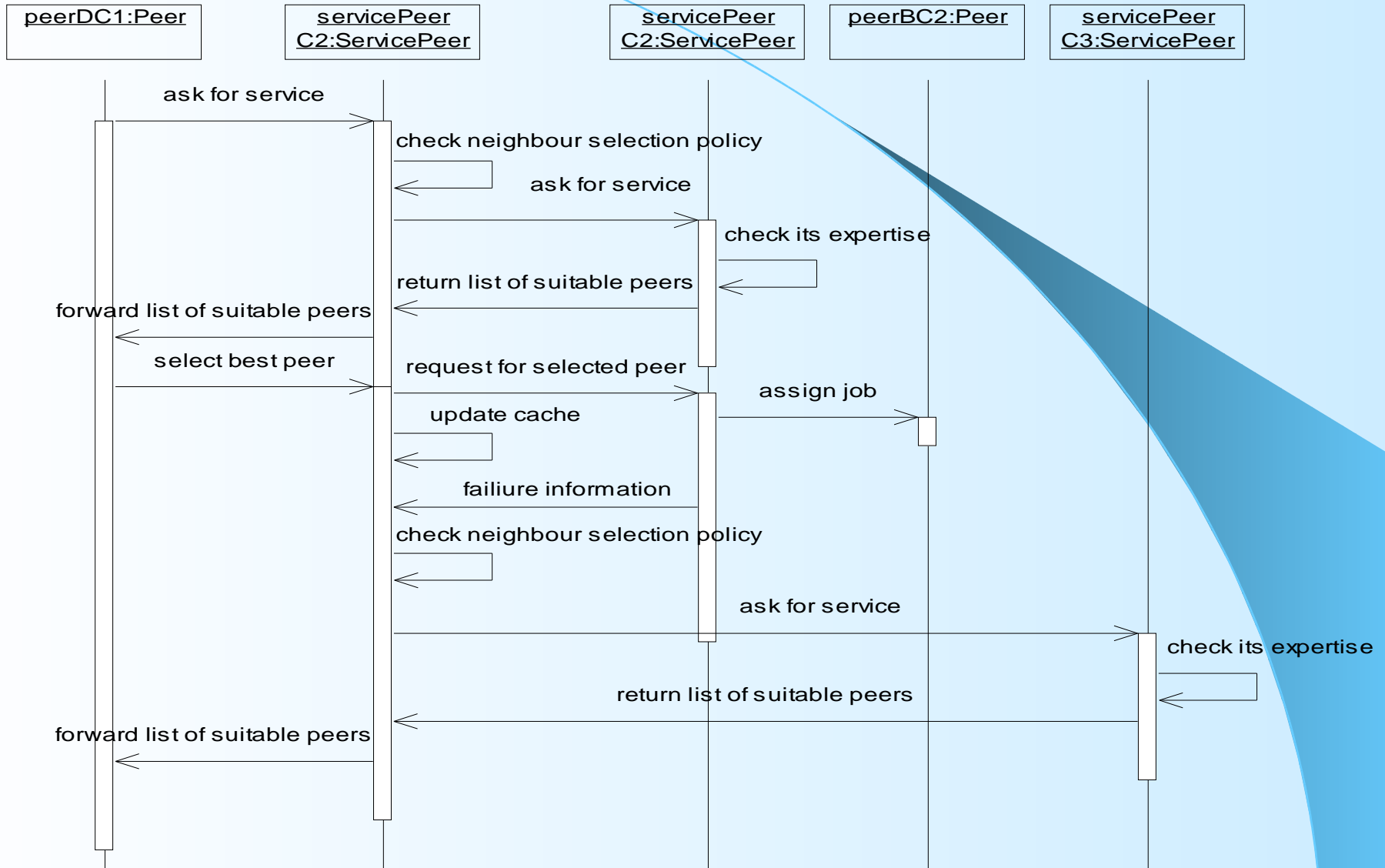
- ⊕ Less resource consumption in discovery for new resources.
- ⊕ Service Peer maintains a neighbour selection policy

# Service-Oriented Peer



*Service-Oriented Peer* manages all member peers for completion of any single request/service

# Non Service-Oriented Peer



*Non Service-Oriented* Peer in a competing community will not interfere with a client application and the service provider peer.

# Co-Operative Community

- ⊕ All peers provide different services
- ⊕ Peers have different expertise
- ⊕ Peers have interests in the expertise of other member Peers.
- ⊕ Each Peer is providing a limited set of services
- ⊕ Each Peer is dependent on at least one other member peer
- ⊕ Each Peer directly or indirectly support the service of other member Peers
- ⊕ Efficient discovery and less interaction with different communities.
- ⊕ Effectiveness of communities is dependent on the co-ordination of individual peers.
- ⊕ Competing Community may have two types of Service Peers
  - Service-Oriented Peer
  - Non Service-Oriented Peer

# Service-Oriented Peer

peerDC1:Peer

servicePeer  
C2:ServicePeer

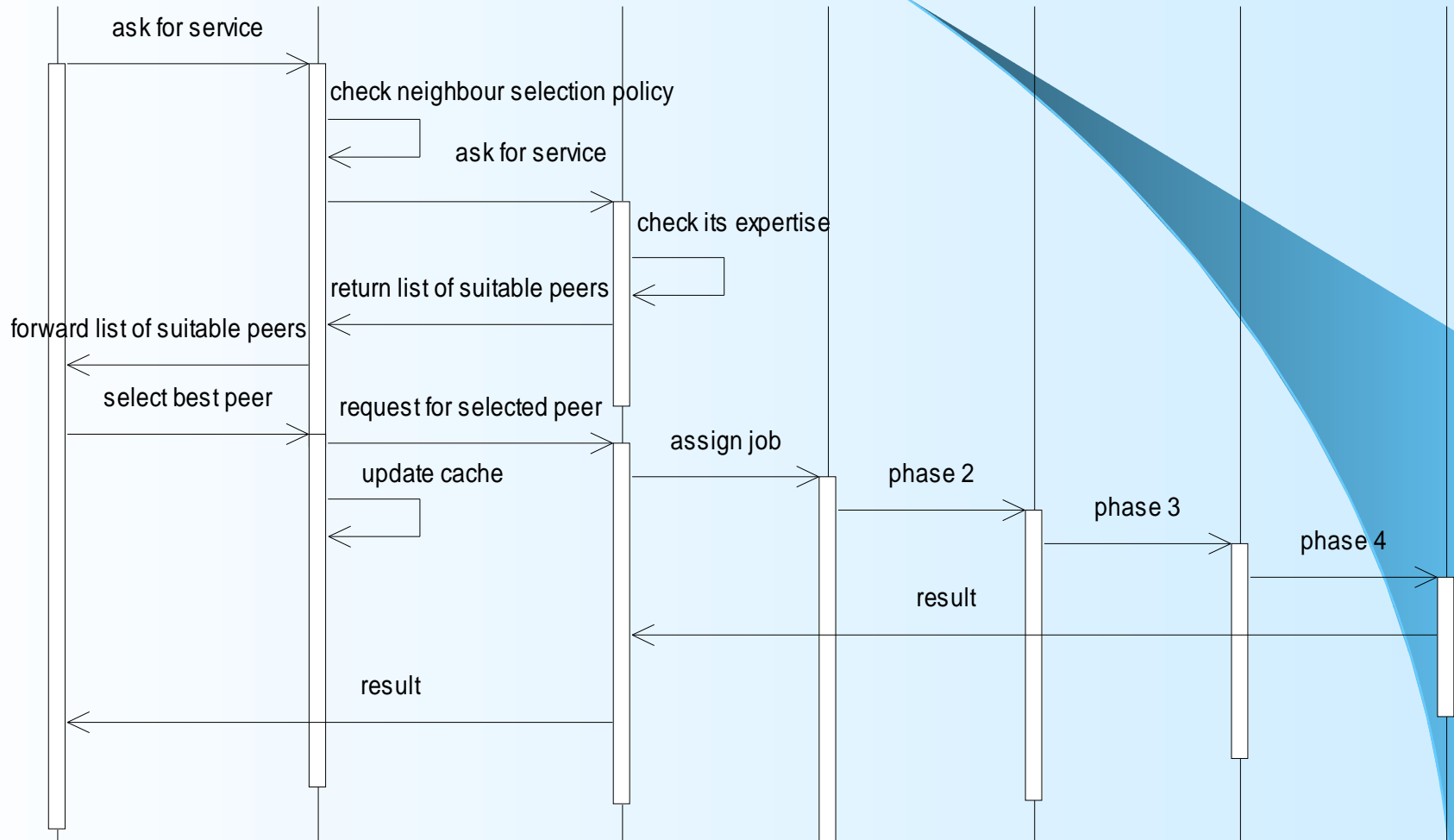
servicePeer  
C2:ServicePeer

peerBC2:Peer

peerAC2:Peer

peerDC2:Peer

peerCC2:Peer



Each member Peer knows about the sequence of phases and Peers involved, and only transfer the final outcome to the Service Peer

# Goal Oriented Community

- Collection of Peers to achieve a particular goal
- Service Peer accomplishes a user-defined goal related to its expertise
- Service Peer locates appropriate Peers and invites them for limited membership
- Membership is terminated on task completion
- This community is a strict type of Co-Operative Communities
- Goal-oriented communities are important in self-organizing systems
- Member Peers interact with each other in arbitrary ways to achieve a given end result

# Ad Hoc Community

- Peers in different communities regardless of the nature of those communities, work together as a team
- Peers interact directly with each other without interference and involvement of a Service Peer
- Peers belonging to different communities providing two different but supporting services form the basis of an ad hoc community
- Concerned Communities must have agreed to use each other's service
- Service Peer has very limited role and member peers are more independent.



# Domain-Oriented Community

- Linking together similar-minded organizations and institutions i.e. academic communities, research communities, and open-source communities.
- Community is not based on the services provided by member Peers
- Community is domain-oriented rather than service-oriented.
- Domain-Oriented Community is quite diverse in nature
- Peers in these communities may not have interest in each other
- Community can be restricted to a particular geographical location
- Enable common mechanisms to view common problems
- Members solve the same type of problems in common ways – using different types of services.

# JXTA Demo

Illustrating a toolkit for supporting  
The formation of electronic  
communities

# Conclusion

- “Community” is a useful metaphor for distributed, dynamic collaborations
- Identify types of communities
- Participants (Peers) in a community offer one or more services
  - Management services
  - Application-specific services
- Explore how services within communities interact

# Questions & Suggestions

