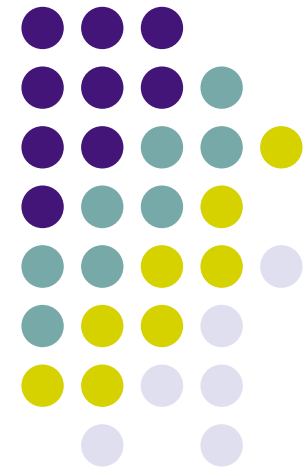


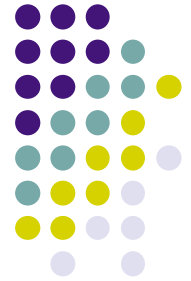
# Agents and Message Passing Concurrency

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**Seif Haridi**

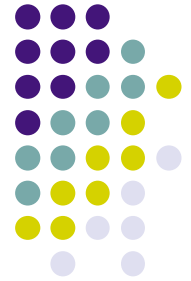
haridi@kth.se





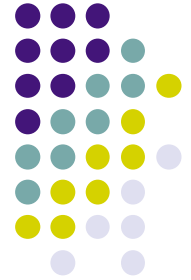
# The World Is Concurrent!

- Concurrent programs
  - several activities execute simultaneously (concurrently)
- Most of the software you use is concurrent
  - operating system: IO, user interaction, many processes, ...
  - web browser, web server, Email client, Email server, ...
  - the Internet: routers, gateways, servers, users machines
  - services in a data center



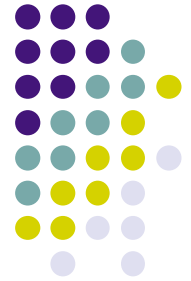
# Client-Server Architectures

- Server provides some service
  - receives message
  - replies to message
  - example: web server, mail server, ...
- Clients know address of server and use service by sending messages
- Server and client run independently



# Peer-to-Peer Architectures

- Similar to Client-Server:
  - every client is also a server
  - communicate by sending messages to each other
- We call all these entities (client, server, peer)  
*agent (actor)*



# Common Features

- Agents

- have identity
- receive messages
- process messages
- reply to messages

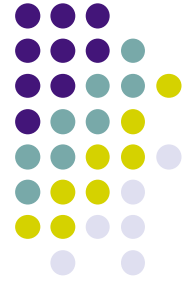
mail address

mailbox

ordered mailbox

pre-addressed return letter

- Now how to cast into a programming language model?



# Message Sending

- Message data structure
- Address port (oz concept)
- Mailbox stream of messages
- Reply dataflow variable in message