Implementation Object Linking and Embedding for Processes Control Unified Architecture Specification on Secure Device

The future standard for communication and information modeling in automation

Yuankui Wang

Agenda

- Introduction and Motivation
- OPC Unified Architecture Specification
- Smart Card Technology
- Implementation Scenario
- Time Lines
- Reference

Introduction and Motivation

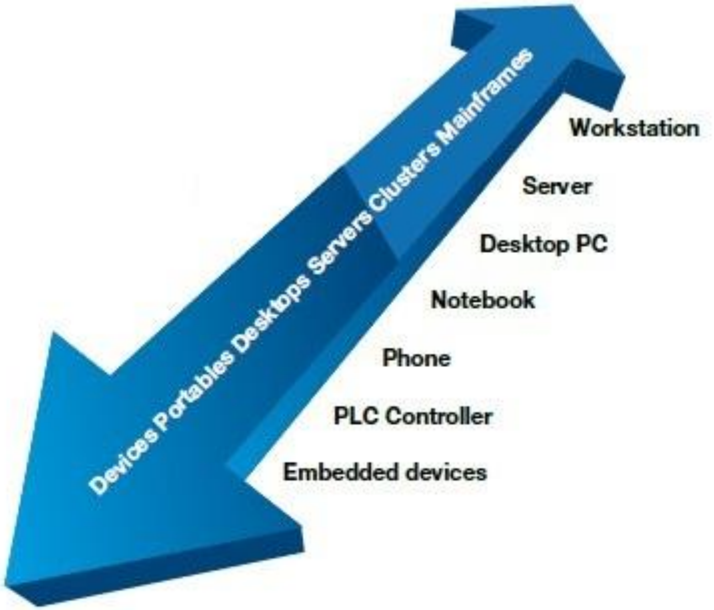
- In industry automation world, Machine-to-Machine technology is widely applied.
- Exchange gather information during collaborative machining process
- motion control in legacy networks
- Over 22,000 products supplied by over 3,200 vendors
- Normal automation systems designed not only for fixed requirements
- Shorter product life-cycles and changing market conditions
- Crucial: system interconnectivity, common interface for communication, security

Classic OPC

- Classic OPC offers solutions for data access, historical data access, alarms and events.
- Plug and produce capability
- But there exits limitations and imperfections
- Windows platform only, DCOM/COM, no complex data structure

OPC Unified Architecture Specification

- Platform independent data communication
- Standardized communication via internet and firewalls
- Protection against unauthorized access
- Availability and reliability
- SOA architecture
- Object oriented meta model
- Simplification by unification



OPC UA Client Server Architecture

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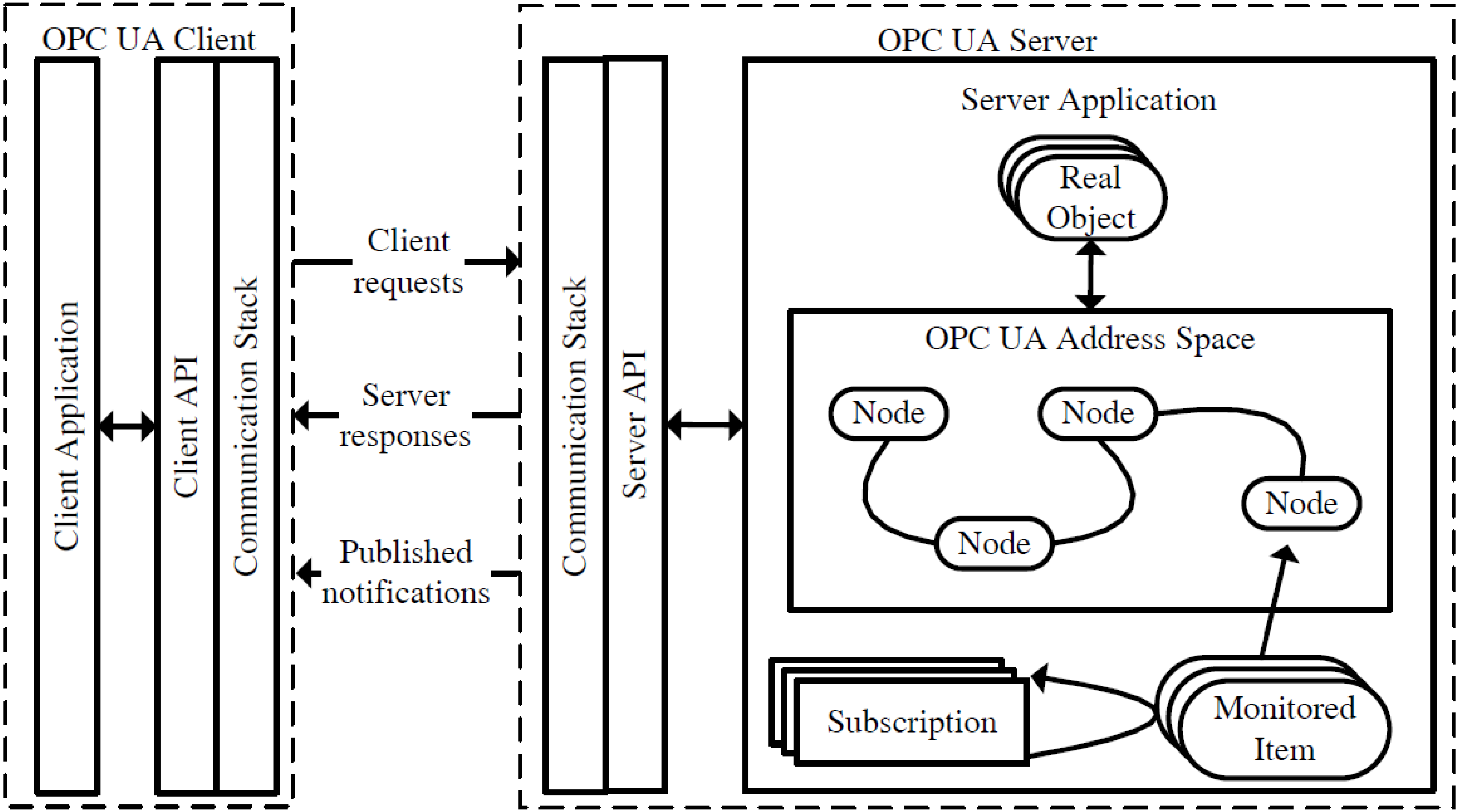

Using Case from Lemgo Smart Factory

- conveyor belt, bottles, pick-place robot, field device with light sensor
- Bottle picked from (x,y), passed for other processing
- OPC UA Server = Controller
- OPC UA Clients = robot, remote device and sensor
- Controller communicates with the remote device over TCP/IP
- Controller instructs the movement of robot using real time channel
- OPC UA Server functions + micro TCP/IP stack

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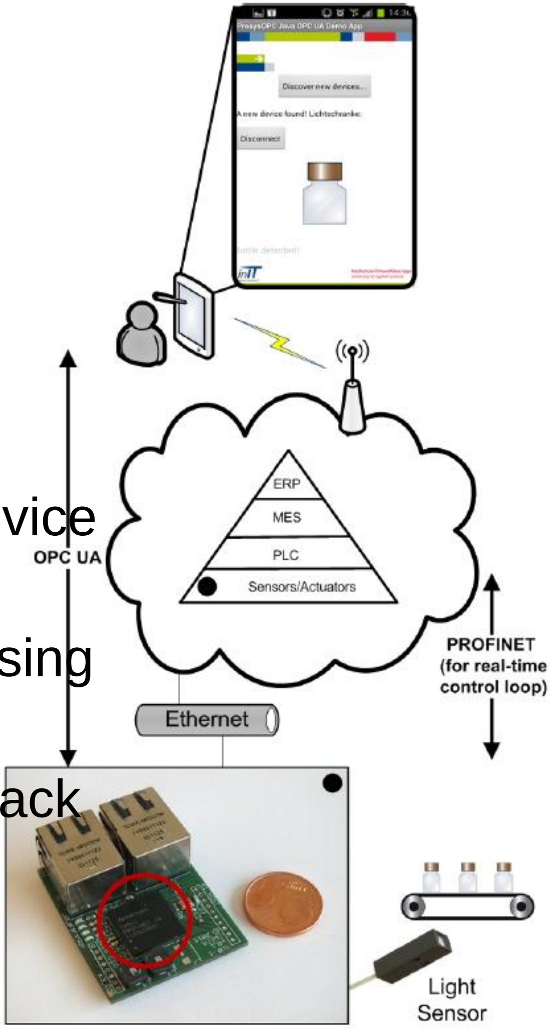
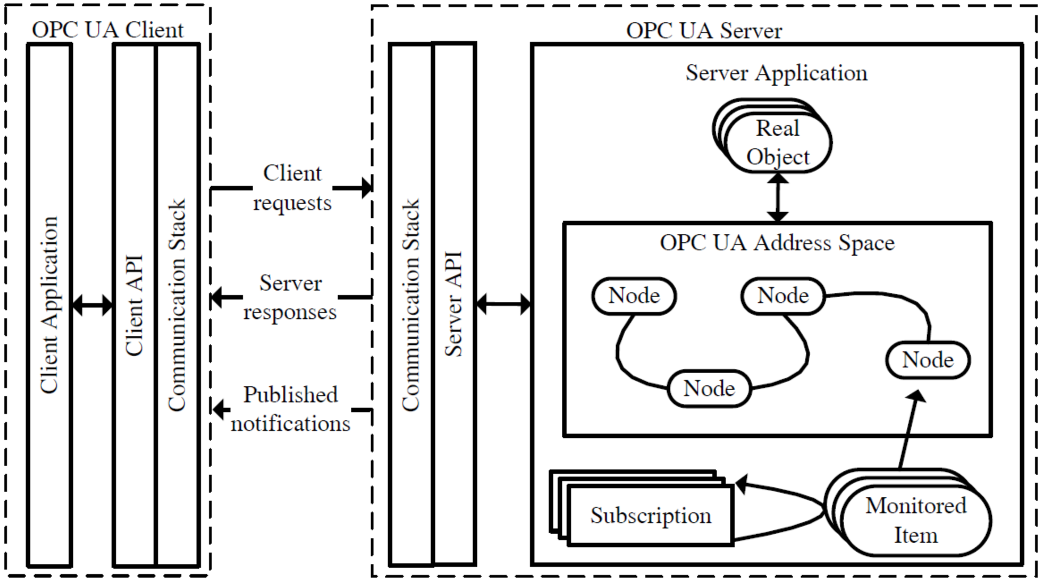


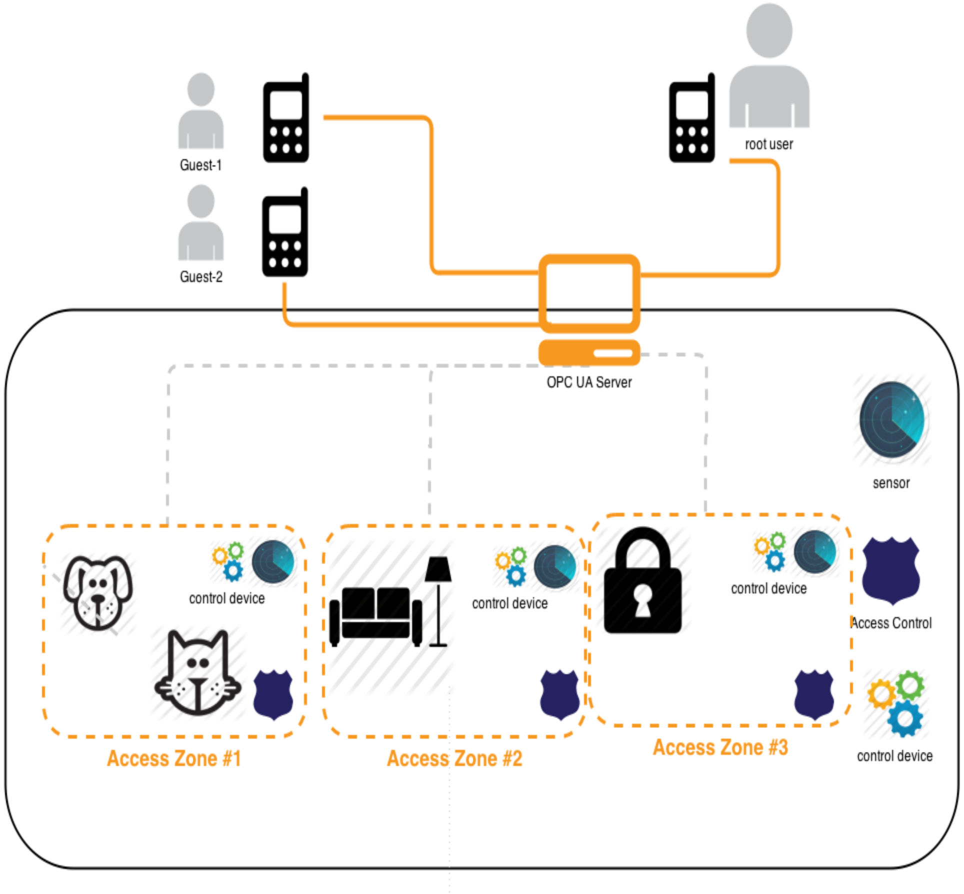
Smart Card Technology

- Finance, Communication, personal identification, payment
- APDU based communication between card and CAD
- Self-containment structure
- Security token
- Process cryptographic algorithms on hardware
- Applications:
  - Cybercash
  - Sending personal data
  - Buy gasoline at gasoline station
  - ….

OPC UA meets Smart Cards



Implementation Scenario



OPC UA Server:
Central Controller

OPC UA Clients:
Sensors
control devices
access control locks
phones

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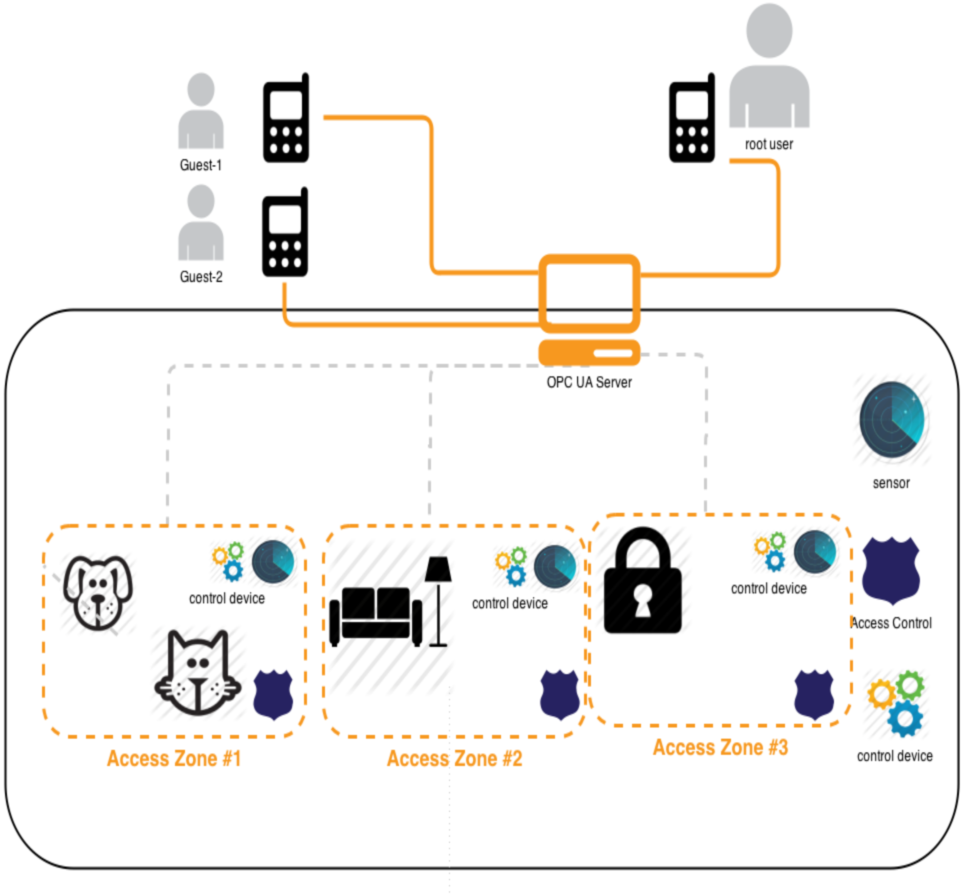
Implementation Scenario



sensor:

□ measure environment variables : luminance, temperature…

□Inform controller

□Connected through inner network

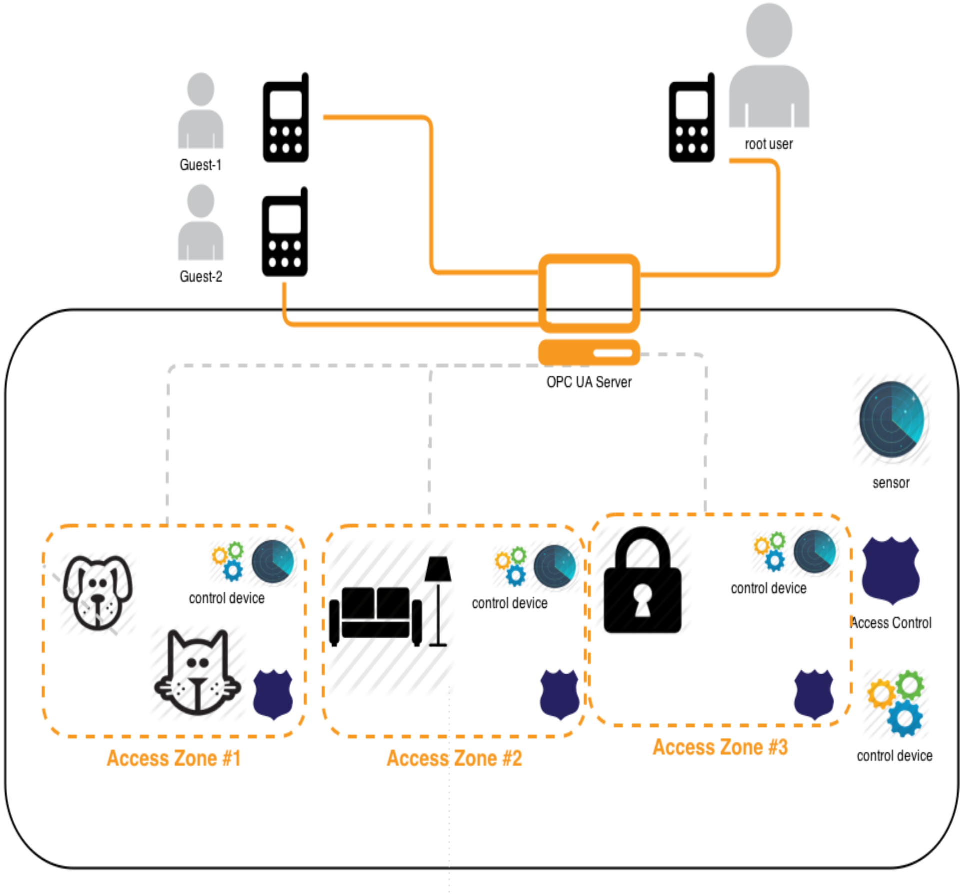
Control device:

□In charge of opening windows, giving pet water and etc

□Taken command from UA Server

□Connected through inner network

Implementation Scenario



Access control lock

□Digital lock

□only allows phone user with enough authority

□different locks have different policies

□Send alarm when illegal access

□Connected through inner network

Phone user:

□Smart Phone

□UICC smart Card

□Installation of Client application

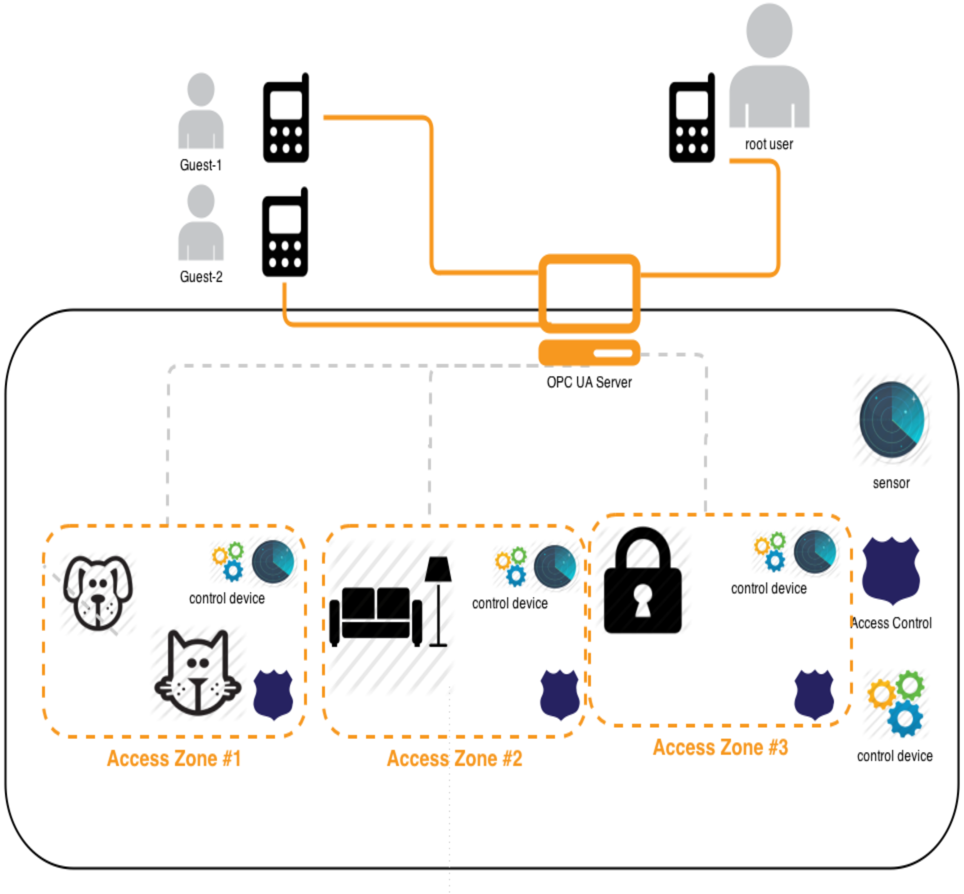
□Root user = house owner

□Guest user = neighbor etc…

□Parameterized control devices through server

□Connected through open network

Implementation Scenario



Central Controller

- □Embedded device with chip card
- □Chip card = security token
- □Take date from sensor
- □Take subscriptions from phone user
- □Inform phone user based on subscription
- □Parameterize control device based on phone user command
- □Auditing

Focus on Security direction

- Confidentiality
- Integrity
- Application authentication
- User authentication
- User authorization
- Traceability
- Availability
- Secure messaging with smart card
- APDU secure communication

Time Lines

- Reference
- OPC UA client/server construction
- Communication stack on UICC smart card
- Deployment
- Combination test and debugging
- Analyze different possible secure policies
- Analyze the performance of secure protocols

Rerferences

- OPC UA specification 1-11
- Stefan-Helmut Leitner and Wolfgang Mahnk: Opc ua-service-oriented architecture for industrial applications
- Wolfgang Mahnke, Stefan-Helmut Leitner:OPC Unified Architecture
- Wolfgang Rankl und Wolfgang Eng: Handbuch der chipkarten - 5. deutsche auflage. (2008)

Thank you! Question?