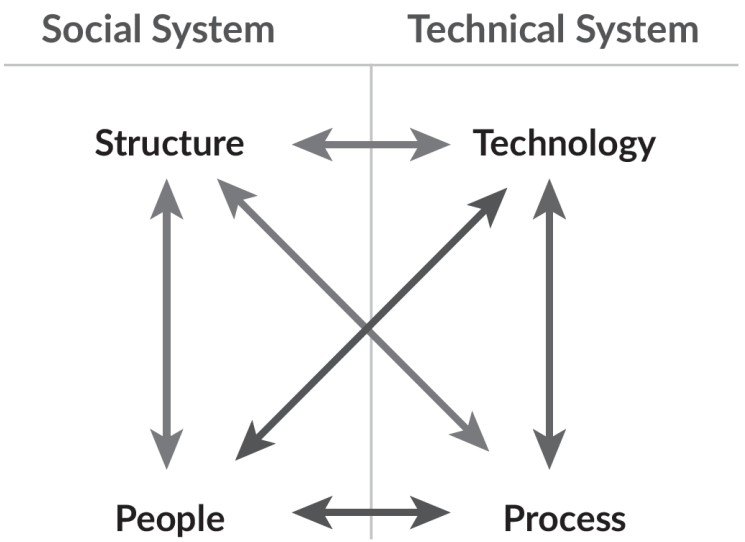
Low level Models – Technology

Low level models

- Structure
- People
- Process
- Technology



Goal

- Model the technological implementation of the IS

Notations

- Application portfolio
- Uml deployment diagram
  - Goal: what are the applications, and where they run
- Data flow diagram
  - Goal: what are the applications, and what data they exchange

Application portfolio

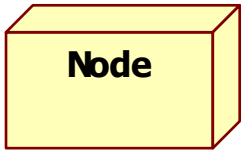
- Application 1
- Application 2
- …

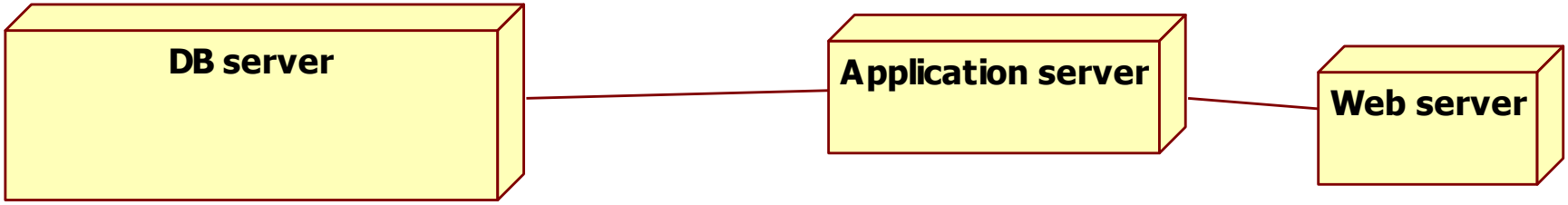
- Applications are artefacts in deployment diagram

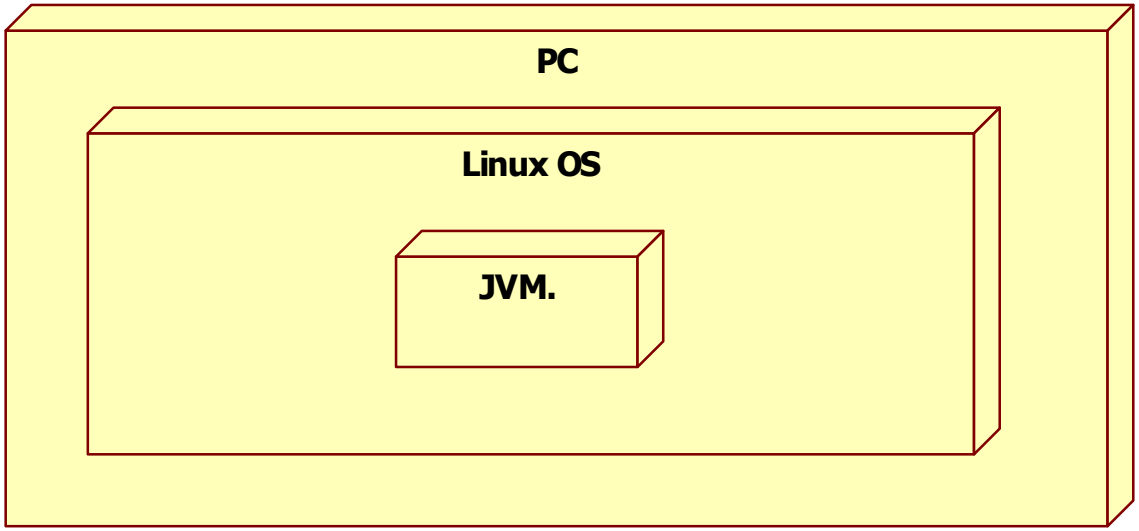
UML Deployment diagram

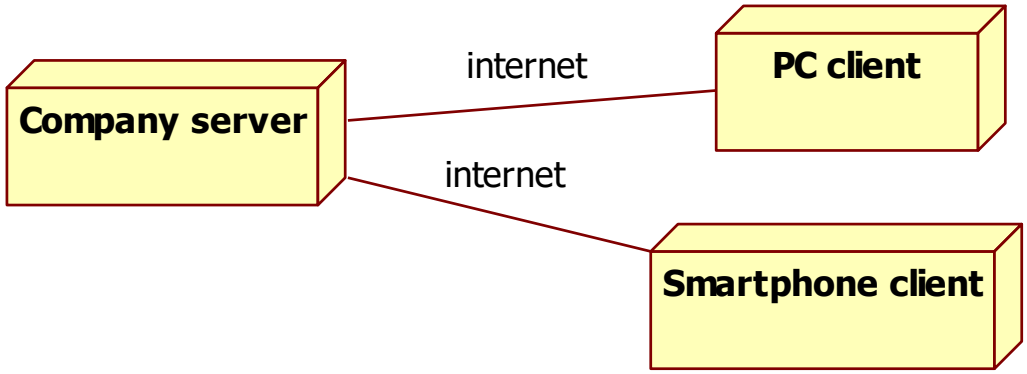
Node, association

- Node: Physical entity or software entity capable of processing
- Association: physical link
- Can be nested



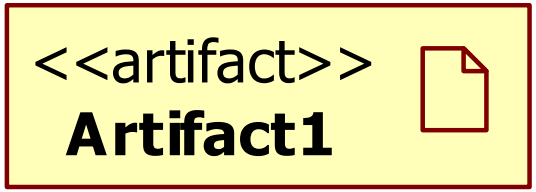

DB server
Application server
Web server


PC
Linux OS
JVM.

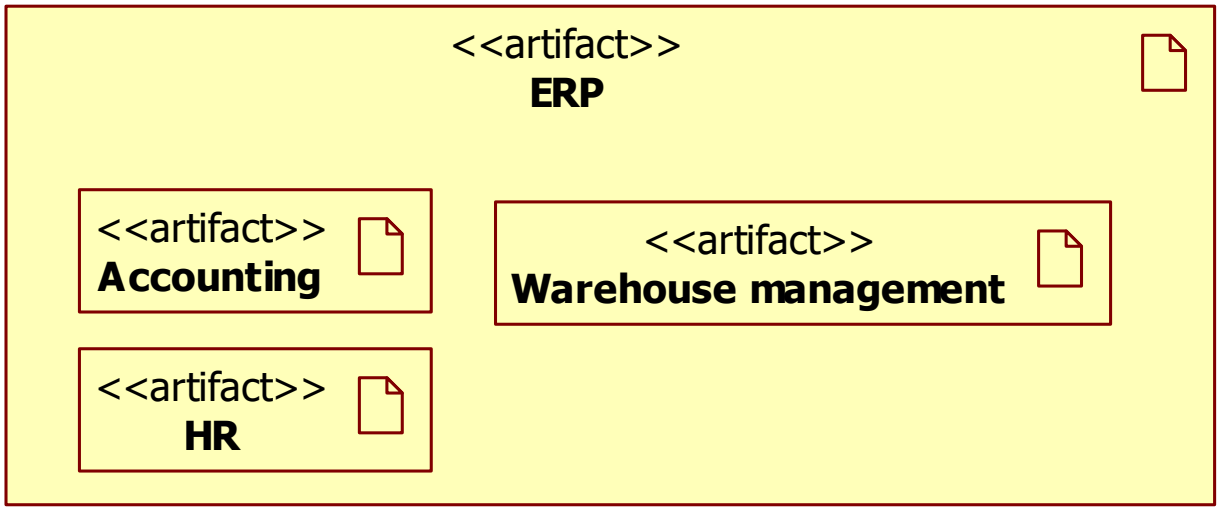

Company server
internet
PC client
internet
Smartphone client

Artifact

- Source file, executable file, library, db table, ..
  - In our case, mostly artifact == application
- Can be nested

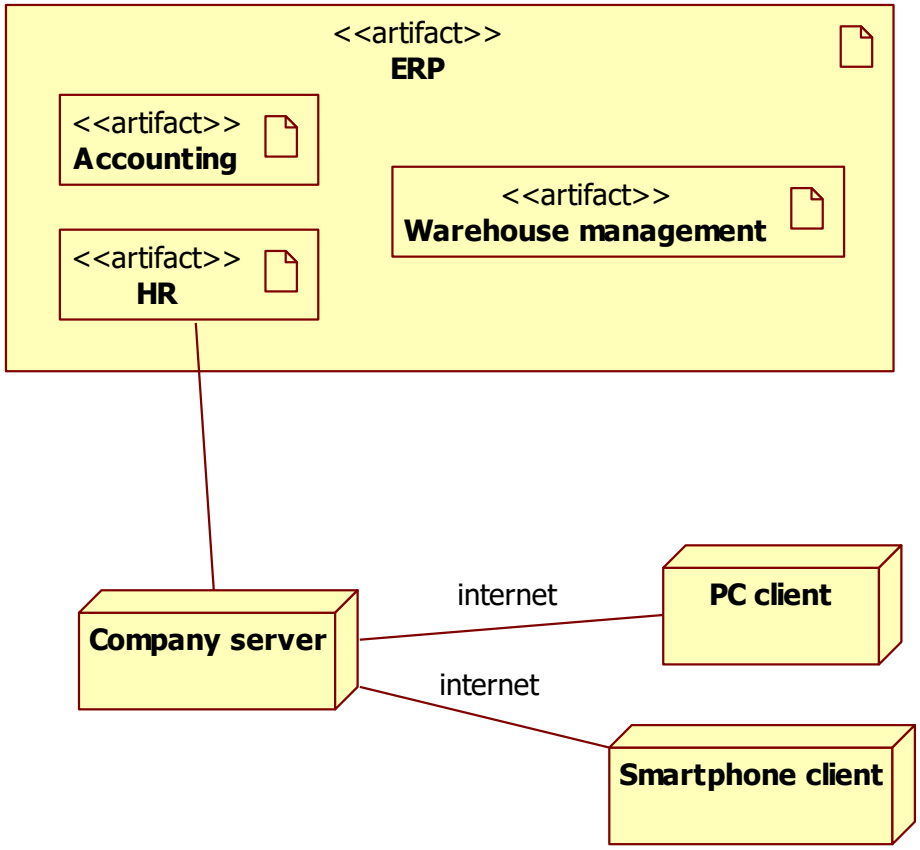


Artifact

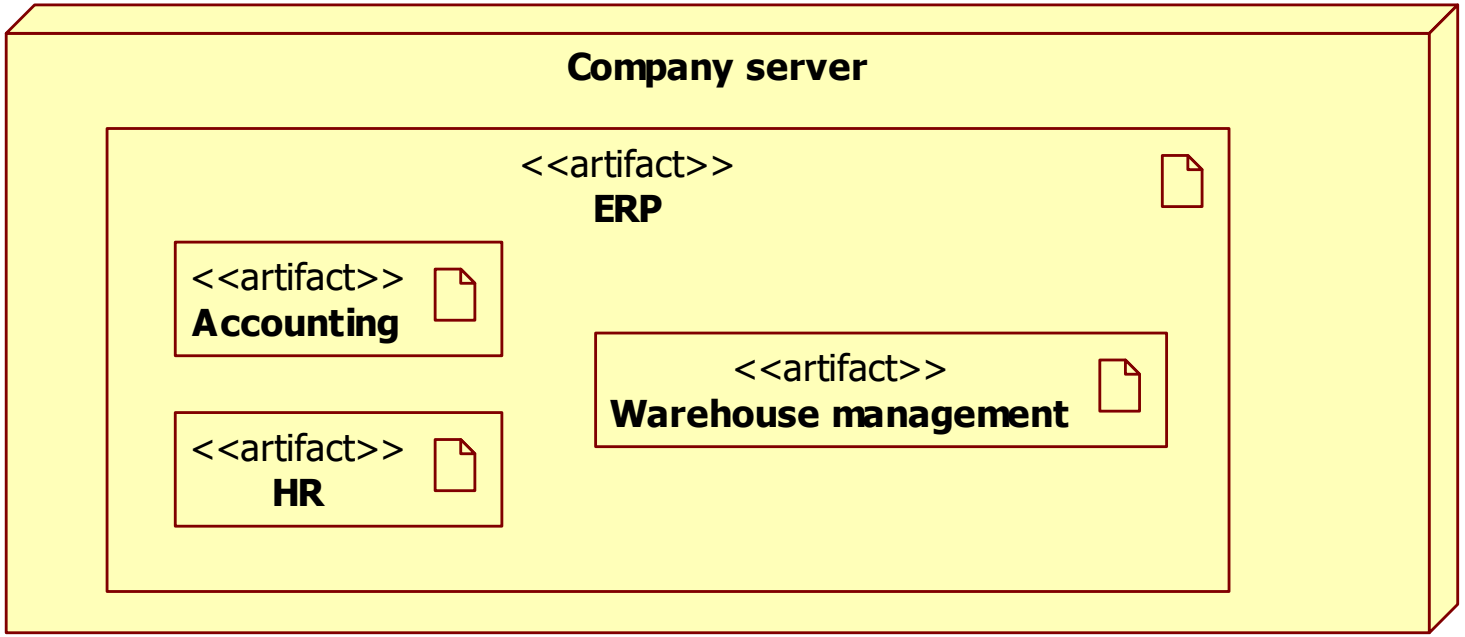

<<artifact>>
ERP
<<artifact>>
Accounting
<<artifact>>
Warehouse management
<<artifact>>
HR

Deployment diagram

- Which artifact on which node



- Using nesting

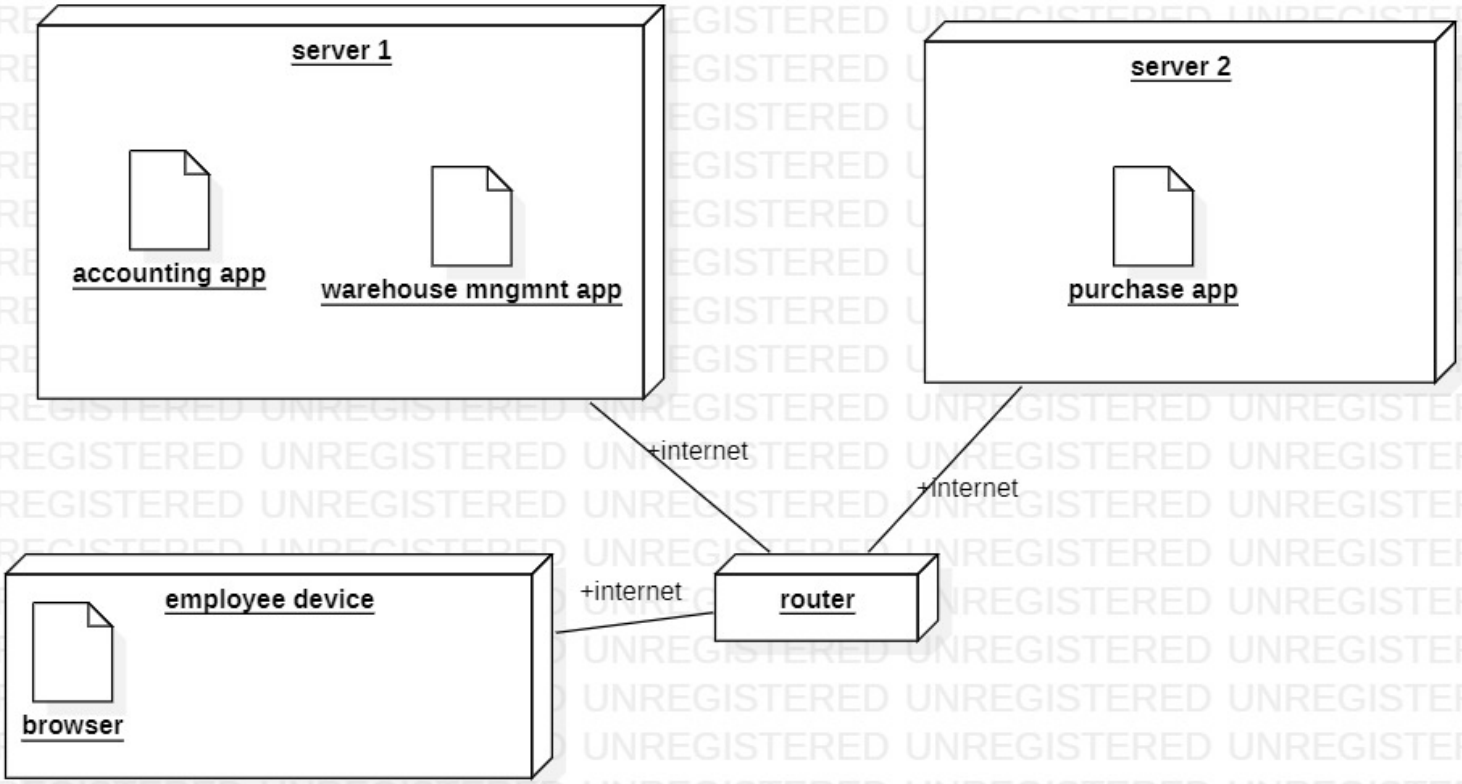


Deployment diagram use

- Artifacts: focus on applications (as listed in the application portfolio)
- Nodes: focus on main computing nodes (managed by the organization, or from an external cloud)

Example

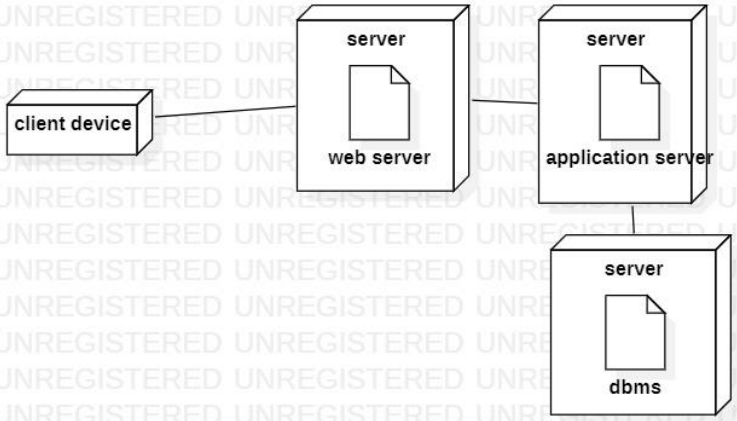
- Application portfolio
  - Accounting application (manage invoices, payments)
  - Warehouse management application (manage inventory, quality checks, returns)
  - Purchases application (manage orders, offers)
- Company has two servers


server 1
accounting app
warehouse mngmnt app
server 2
purchase app
+internet
+internet
employee device
+internet
router
browser

Architectures

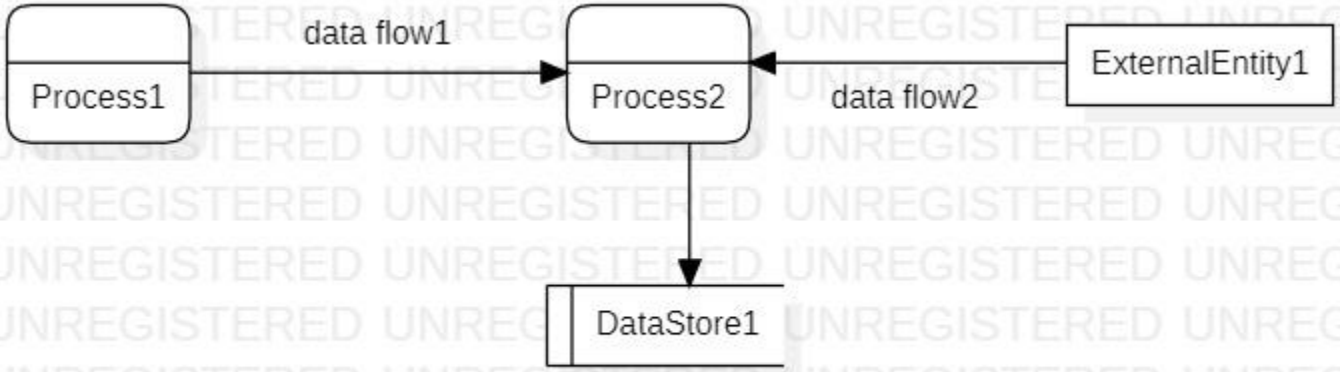
- Deployment diagram shows also the architectural style used
  - Client server

  - Three tiers



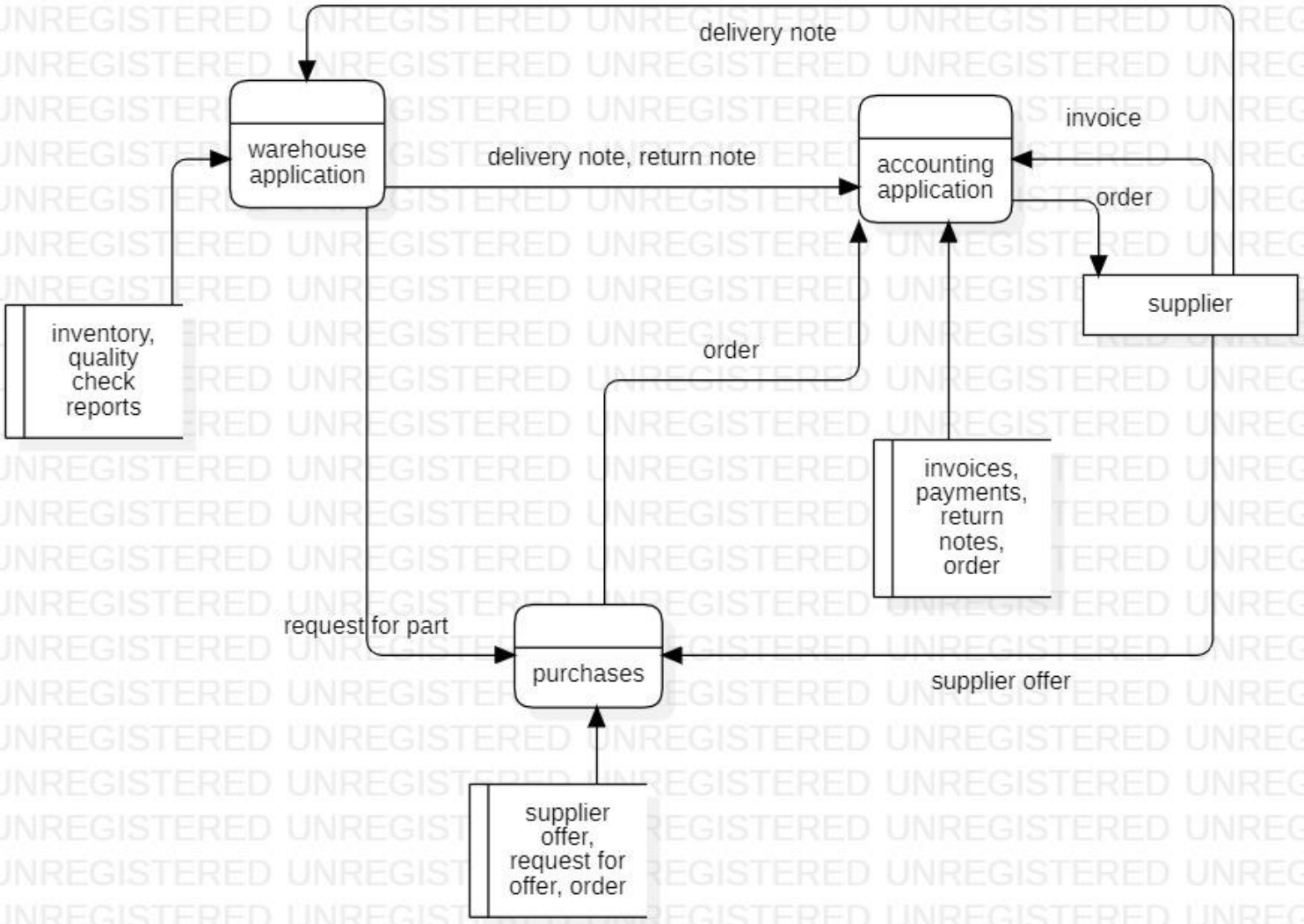
Data Flow diagram

- Process: receives and transforms data
- Data flow: stream of data
- Data store: stores data
- External entity



Data flow diagram use

- Processes: focus on applications (as from application portfolio)
- Data flow: focus on key information exchanged between applications


delivery note
warehouse application
delivery note, return note
accounting application
invoice
order
supplier
inventory, quality check reports
order
invoices, payments, return notes, order
request for part
purchases
supplier offer
supplier offer, request for offer, order

Links between models

- Keep consistency between the models
  - Organizational model vs BPMN
    - In BPMN pools and lanes replicate parts of the organizational model
  - BPMN vs data model
    - In BPMN data artifacts must match with classes in data model
  - Data model vs data flow model
    - Data flows or data stores in data flow model must match classes / attributes in data model
  - BPMN and deployment diagrams
    - Artifacts (== software applications) in deployment diagram must contain software functions used in BPMN activities

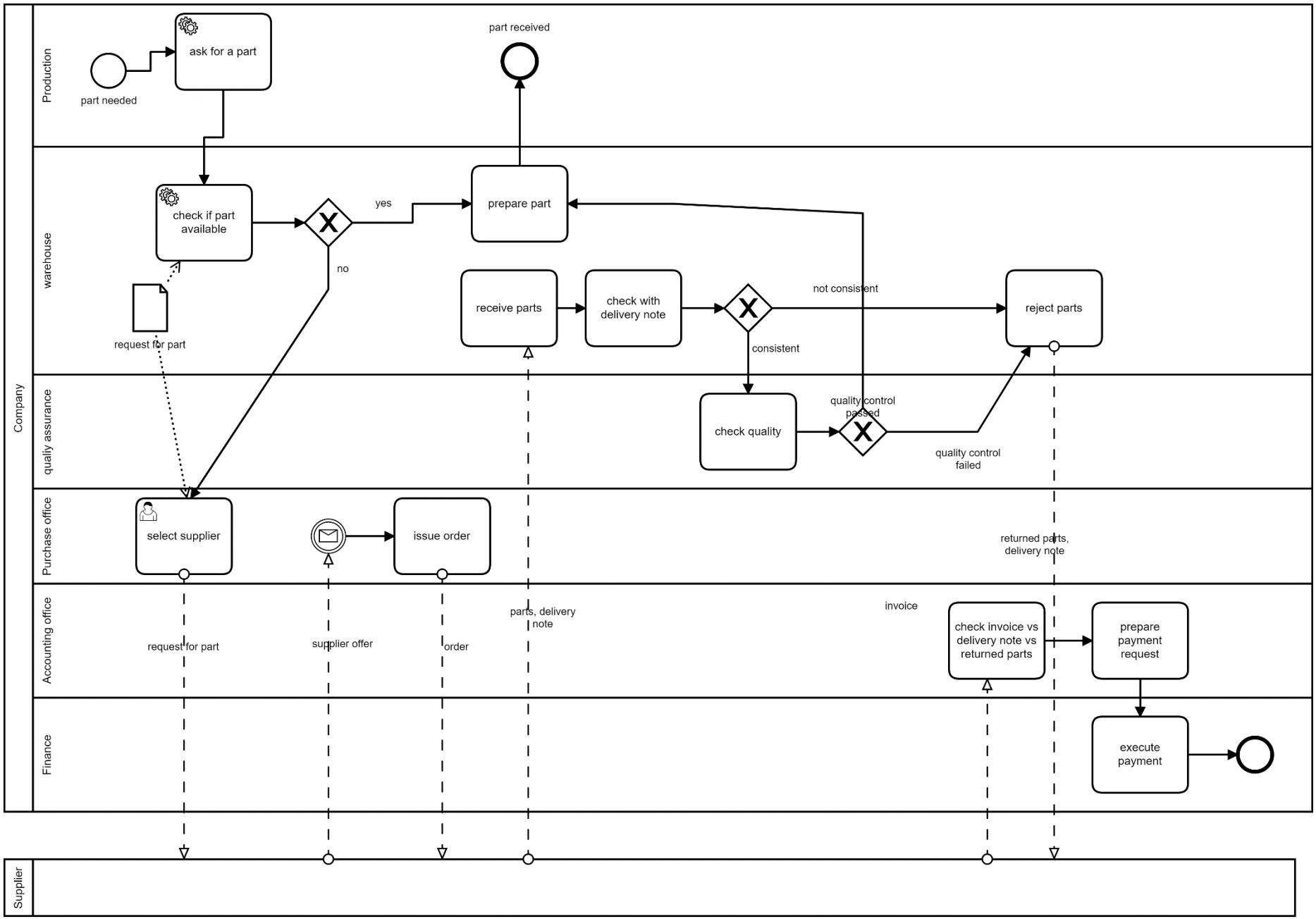
From process to software functions

- A business process is supported by one or more software applications
  - Cfr Application portfolio = set of applications used in an organization
- A software application is made of many software functions
- Considering each task in process model (BPMN), find software functions needed to support the process

BPMN vs deployment

Activity / task in process (BPMN)	Sw functions in sw application A	Sw functions in sw application B	Sw functions in sw application x

Ex purchase


Company
Production
warehouse
quality assurance
Purchase office
Accounting office
Finance
Supplier
part needed
ask for a part
part received
check if part available
yes
no
prepare part
request for part
receive parts
check with delivery note
not consistent
reject parts
consistent
check quality
quality control passed
quality control failed
select supplier
issue order
returned parts, delivery note
request for part
supplier offer
order
parts, delivery note
invoice
check invoice vs delivery note vs returned parts
prepare payment request
execute payment

Ex: purchase

activity	Accounting	Warehouse management	Purchase management
Ask for a part		-Create a request for part -Search a request for part -Copy a request for part -edit a request for part	
Check if part available		-Search part in inventory -Get n available for a part	
Prepare part		-remove n part from inventory	
Receive part		-Search part in inventory -add n part to inventory	