# Demaq: A Foundation for Declarative XML Message Processing

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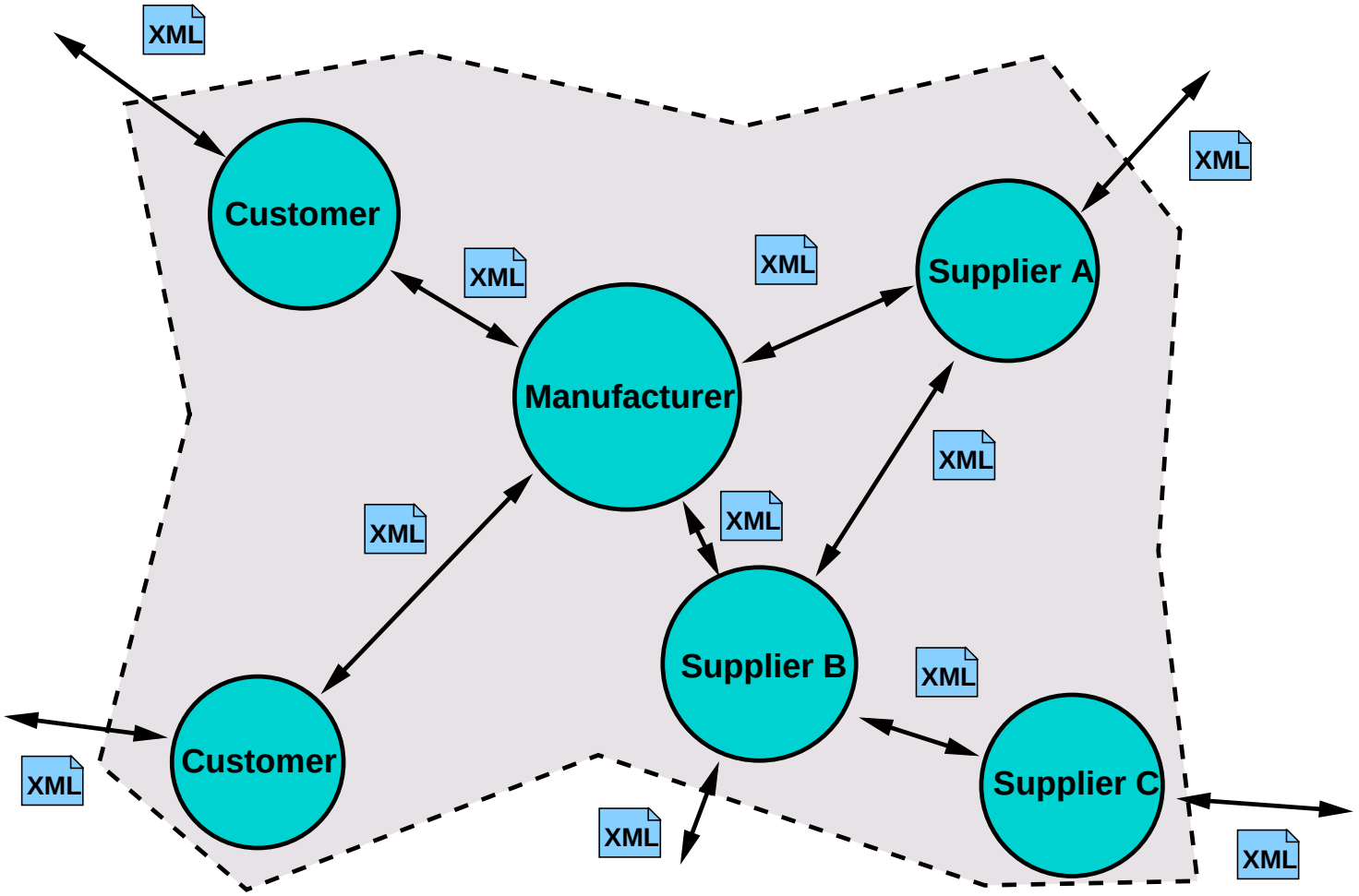
# XML Messaging

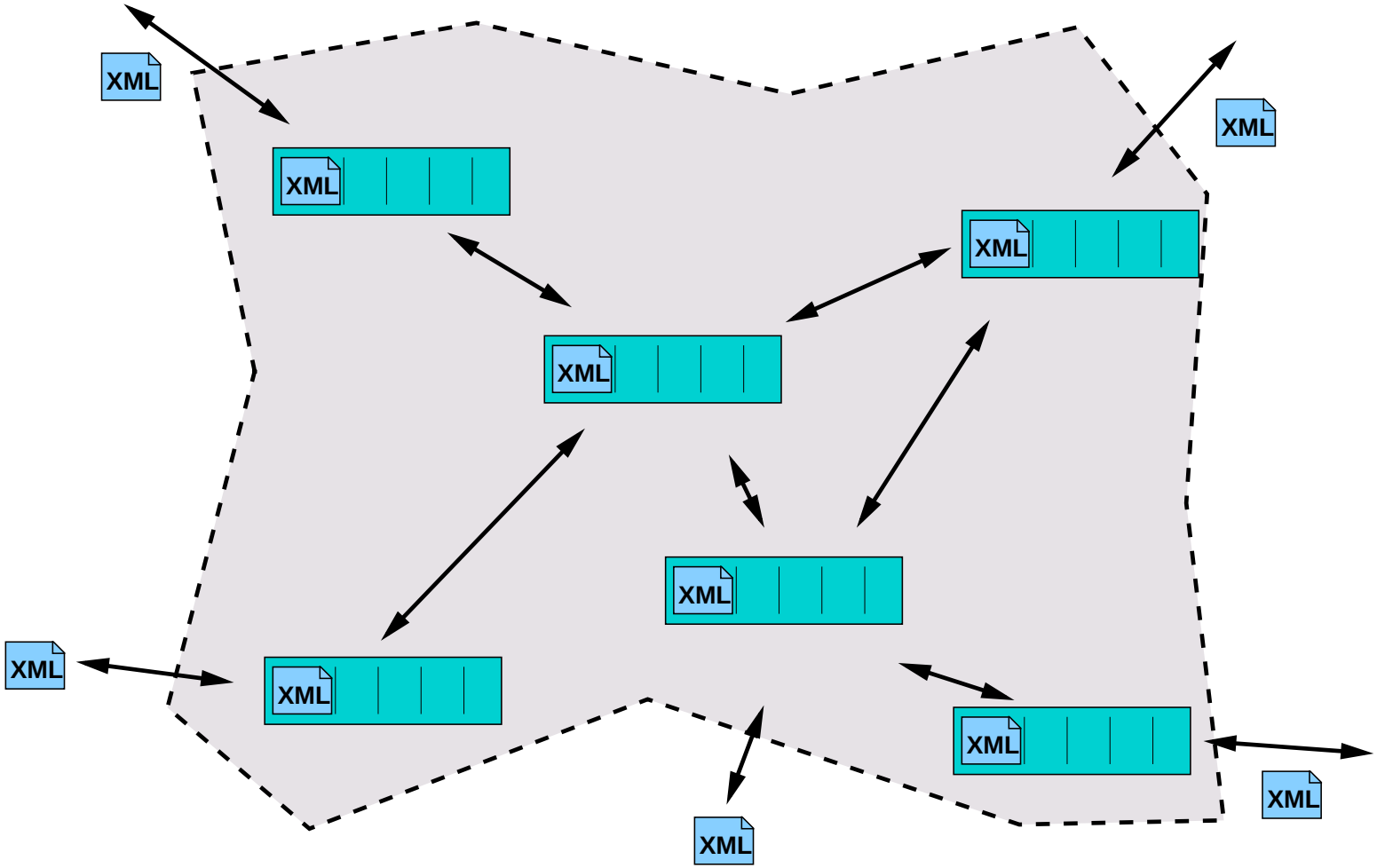





SOA, Web Services, AJAX, RSS/Atom...

# Networks of XML Queues





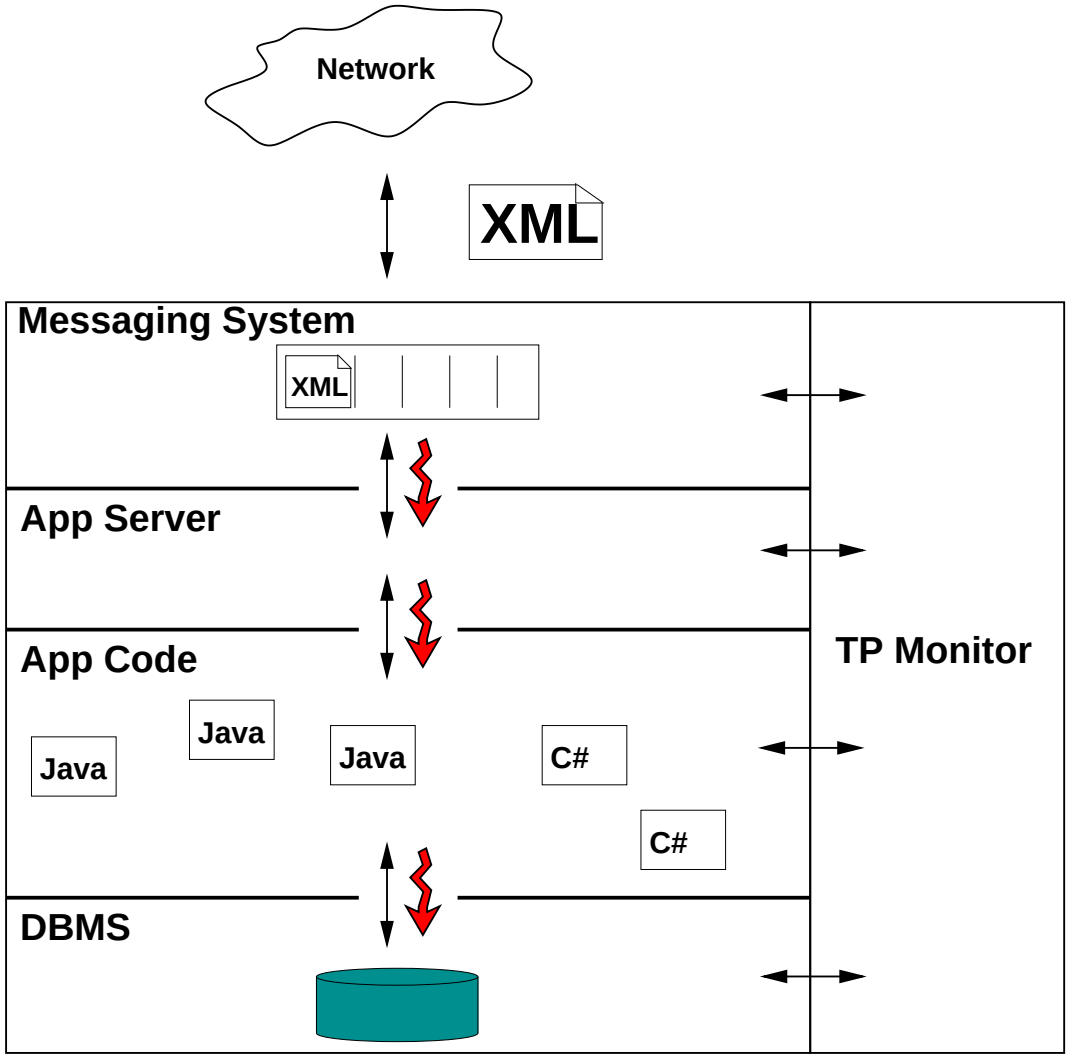
# Messaging Rules



- "If a request for an offer comes in, forward it to the legal, finance, and planning departments"
- "If the delivery of all items has been confirmed, send a completion message to the customer"

# ∞-tier Architectures





# State of the Art



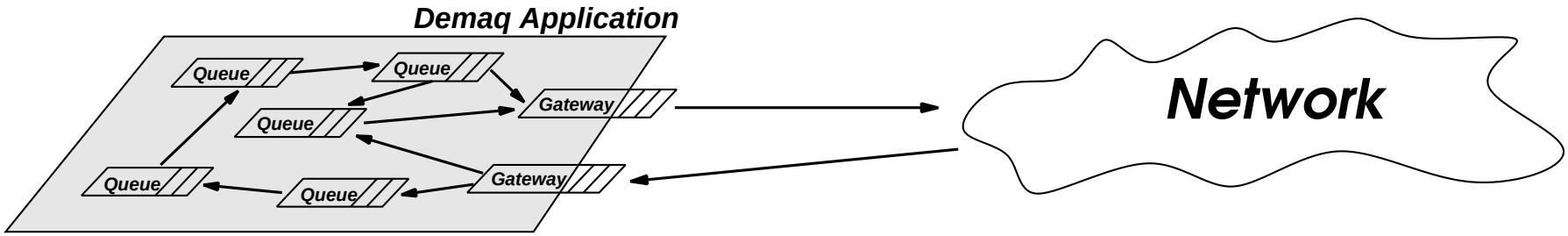
```
topic = ((QIjmsSession)t_sess).getTopic("strmadmin", "oe_queue");
t_pub = t_sess.createPublisher(topic);
db_conn = ((QIjmsSession)t_sess).getDBConnection();
agent = new QIjmsAgent("explicit_enq", null);
adt_msg = ((QIjmsSession)t_sess).createAdtMessage();
lcr_data = new StringBuffer();
lcr_data.append("<ROW_LCR ");
lcr_data.append("xmlns='http://xmlns.tentacle.com/streams/schemas/lcr'");
lcr_data.append("xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'");
lcr_data.append("xsi:schemaLocation='http://xmlns.tentacle.com/streams/schemas/lcr ");
lcr_data.append("http://xmlns.tentacle.com/streams/schemas/lcr/streamslcr.xsd'>");
lcr_data.append("<source_database_name>source_dbname</source_database_name>");

... MORE DOCUMENT CONSTRUCTION HERE ...

xml_lcr = tentacle.xdb.XMLType.createXML(db_conn, lcr_data.toString());
adt_msg.setAdtPayload(xml_lcr);
((QIjmsMessage)adt_msg).setSenderID(agent);
System.out.println("Publish message 3 - XMLType containing LCR ROW");
recipList = new QIjmsAgent[1];
recipList[0] = new QIjmsAgent("explicit_dq", null);
((QIjmsTopicPublisher)t_pub).publish(topic, adt_msg, recipList);
t_sess.commit();
```

# Demaq Application

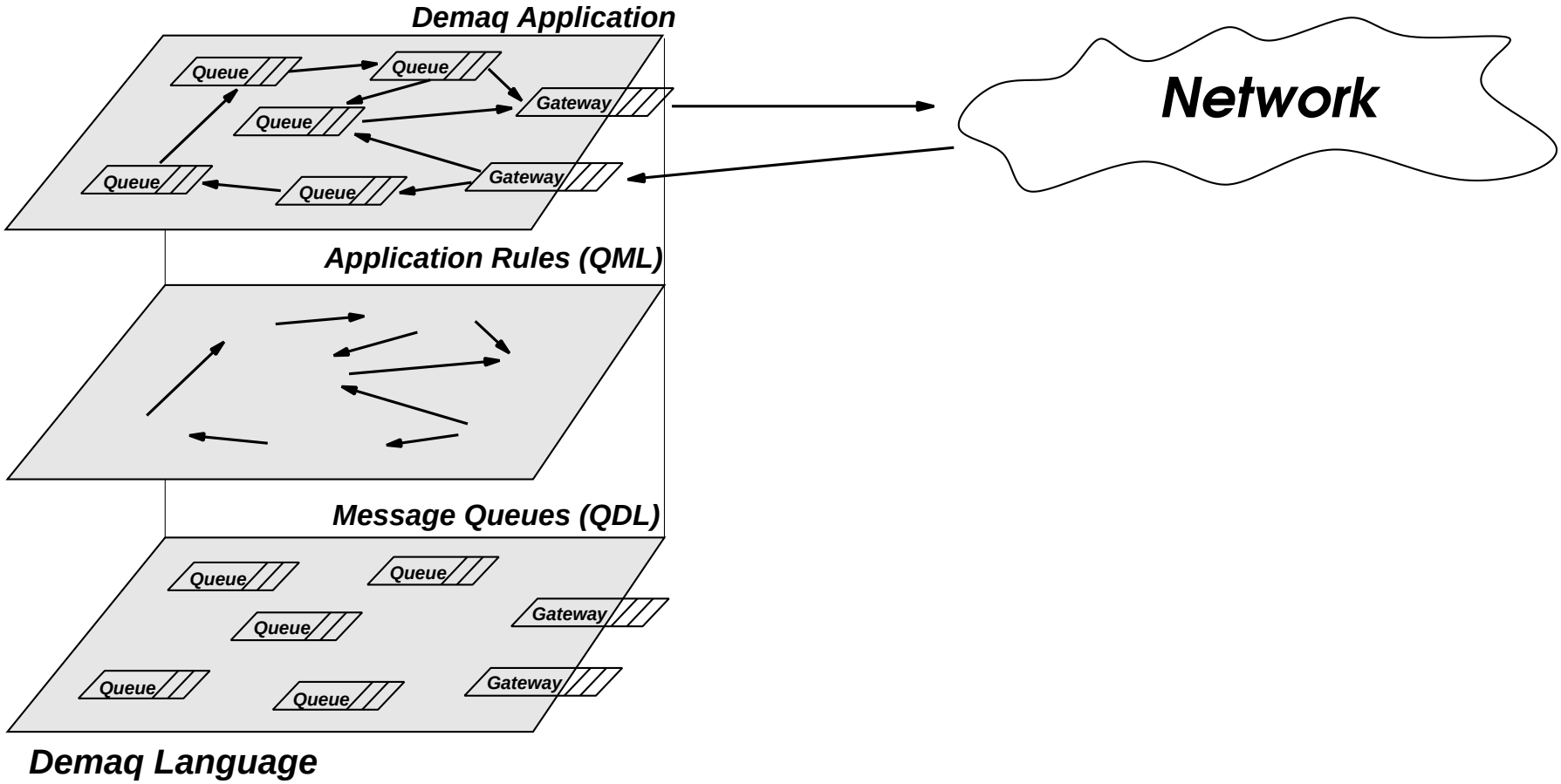





- Complete
- **Declarative**
- Executable

# Demaq Language(s)





# Demaq QML Rules



- "If the delivery of all items has been confirmed, send a completion message to the customer"

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XML messages $\longrightarrow$ new XML messages

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XQuery Update Facility
+ Queuing Primitives

XML messages $\longrightarrow$ new XML messages

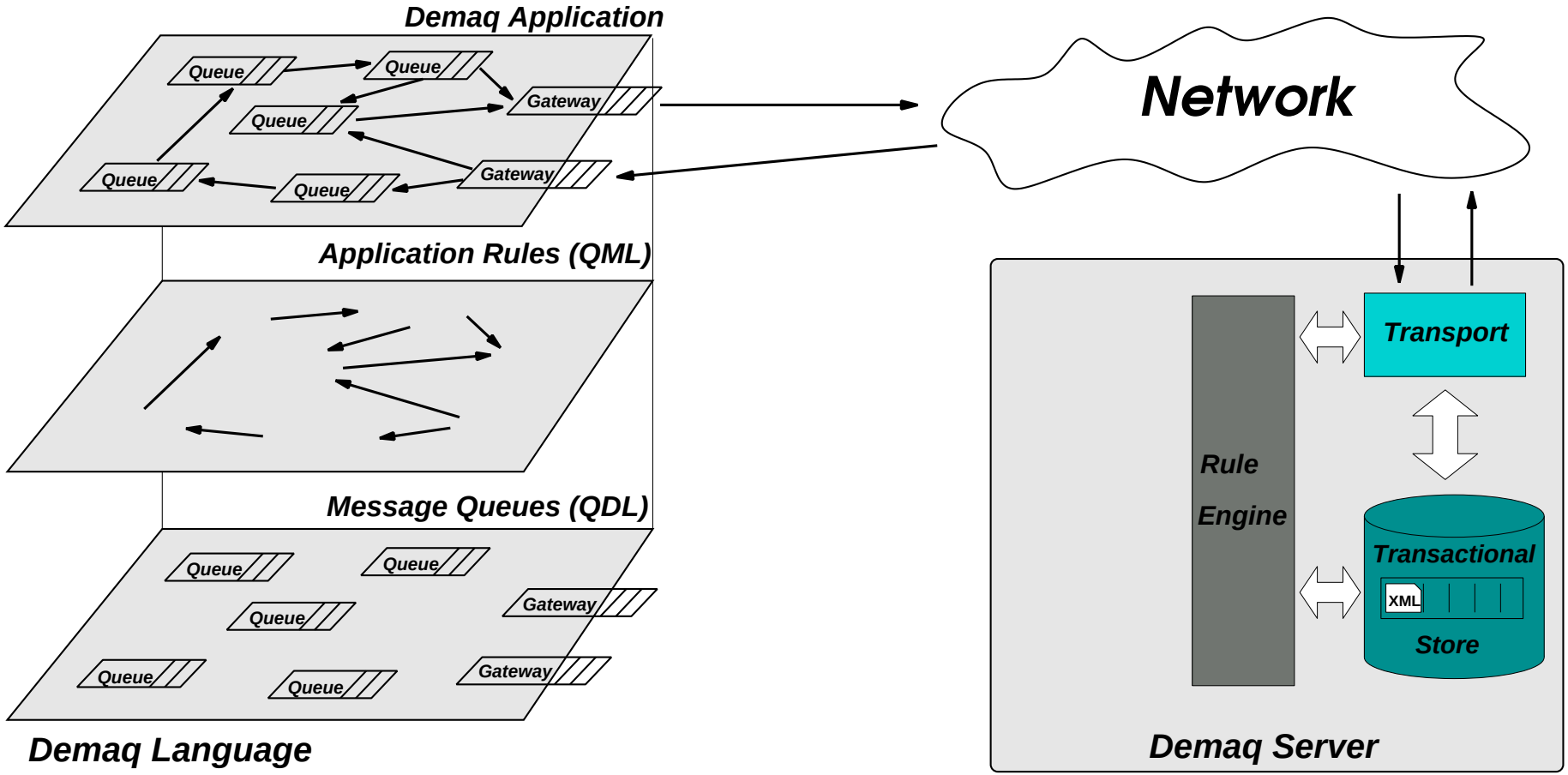
# Demaq Sample Rule



```
create rule sendComplete for orderMsgs
if (//deliverymsg/@type = "confirm") then
  let $ordered :=  fn:count(qs:slice()//ordermsg//item)
  let $delivered :=  fn:count(qs:slice()//deliverymsg/item)
 where $ordered eq $delivered
  return do enqueue <done> {//orderID} </done>
                    into customerReply
```

# Demaq Server





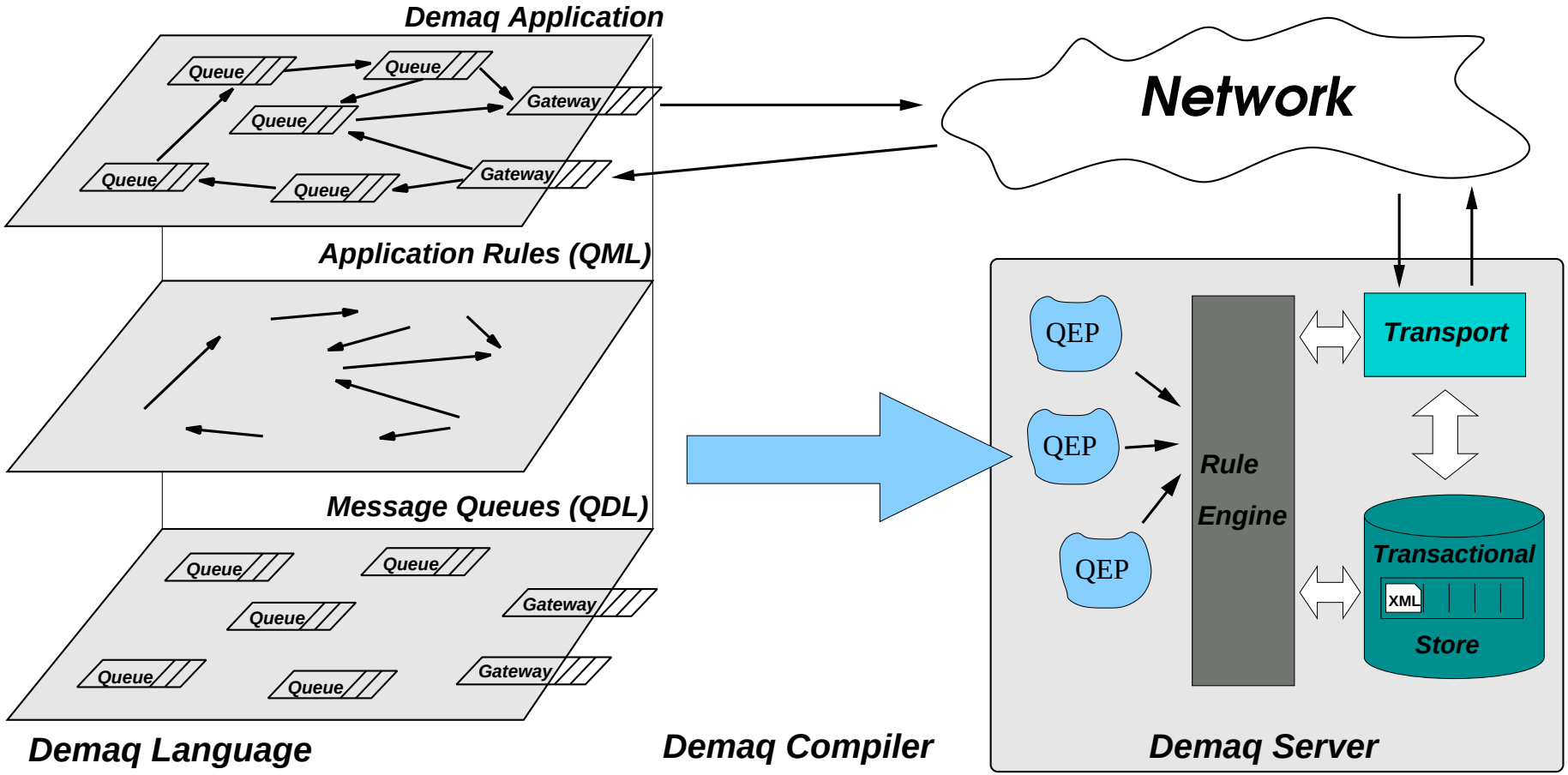
# Messages all the way



- Everything is an XML message
  - Rule Input
  - Rule Output
  - Errors
  - Timeouts
- Messages are processed once, but kept "forever"
- Message History
  - captures process state
  - organized into slices (virtual queues)
  - declarative expiration

# Demaq Project





# Thank you



http://demaq.net

http://db.informatik.uni-mannheim.de

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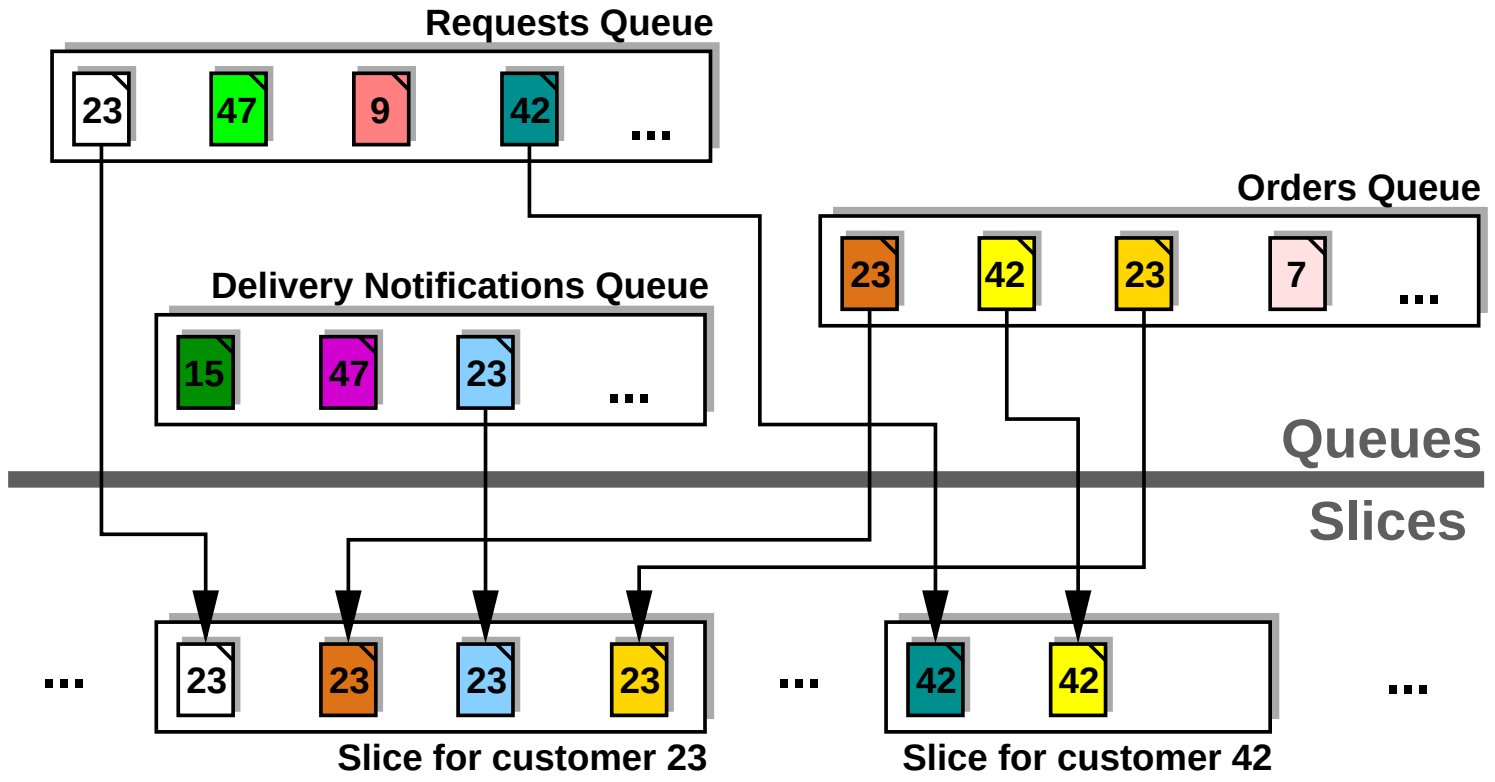
# Slices



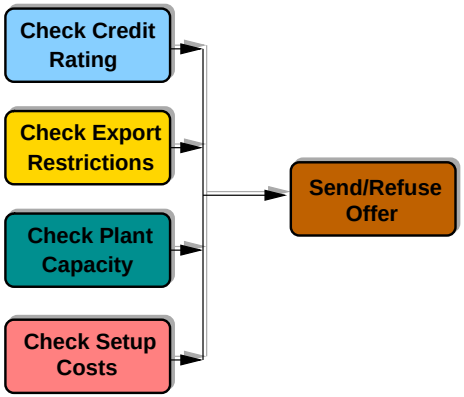



```
create property customerID fixed
  queue requests, orders,
        deliveryNotifications value //customerID
create slicing customers on customerID
```

# Slice usage



- Merge parallel control flow




```
create property correlationID fixed
  queue creditCheck, exportCheck,
        plantCheck, setupCheck value //correlationID
create slicing checkResults on correlationID

create rule merge for checkResults
if(count(qs:slice()) eq 4) then ...
```

# Error Handling



- Plenty of error sources in distributed applications
  - Application-related (dynamic errors)
  - Message-related (invalid XML, wrong schema)
  - Network-related (disconnects, routing, . . . )
  - . . .
- Message-based error handling
- Error queues, e.g. for rules

```
create rule errorSource for foo errorqueue errors
```

# A Demaq Rule



```
create rule newOfferRequest for customerMsgs
if (//offerRequest) then
  let $customerInfo :=
      <requestCustomerInfo reqID="{//requestID}">
         <customer>{//customerID}</customer>
      </requestCustomerInfo>
  let $exportRestrictionInfo := ...
  let $plantCapacityInfo := ...
  return do enqueue $customerInfo into finance,
         do enqueue $exportRestrictionsInfo into legal,
         do enqueue $plantCapacityInfo into supplier
```

# Work in progress



- Optimization across rules
- Optimization/verification across sites
- Template Folding [XIMEP06]
- Rules driven by XML Schema validation

# Demaq Goals



- Declarative XML message processing language
  - Move work from programmer to system
  - Data independence
  - Optimizable
- Execution Engine
  - Reliability
  - Scalability
  - Reuse DB system knowledge