

Context-Oriented Domain Analysis

Brecht Desmet

Programming Technology Lab

Context-aware system



IgnoreAdaptation



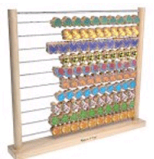
AnswermachineAdaptation



RedirectAdaptation



CounterAdaptation



WiFiAdaptation



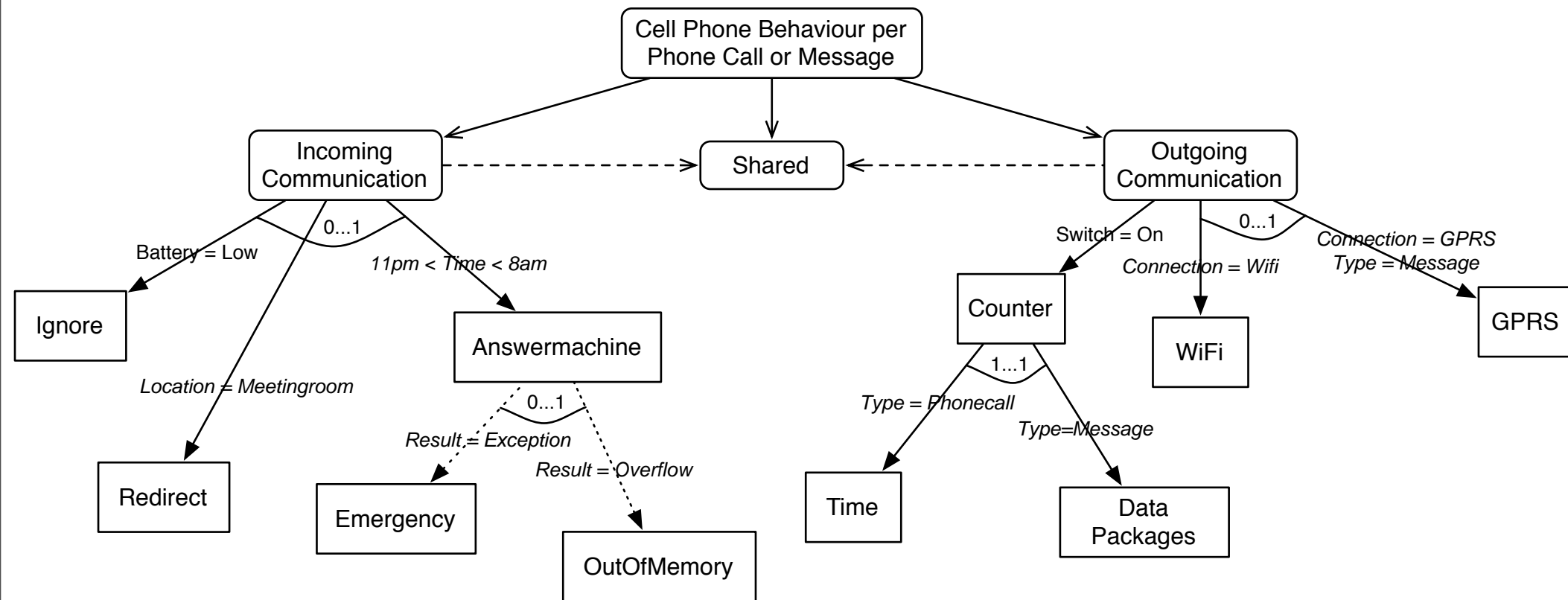
GPRSAdaptation



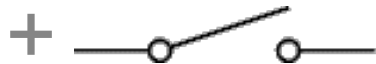
CODA

- Approach for modelling **context-aware software requirements**.
- Means to **formalize** and **structure** software requirements.
- Increases **communication** for various stakeholders during software life cycle.
- High-level description which can be **mapped** to computational level.

CODA Diagram



CODA Diagram



Cell Phone Behaviour per
Phone Call or Message

Incoming
Communication

Shared

Outgoing
Communication

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GPRS

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Emergency

OutOfMemory

Time

Data
Packages

Battery = Low

0...1

11pm < Time < 8am

Location ≠ Meetingroom

Result = Exception

0...1

Result = Overflow

Type = Phonecall

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Type = Message

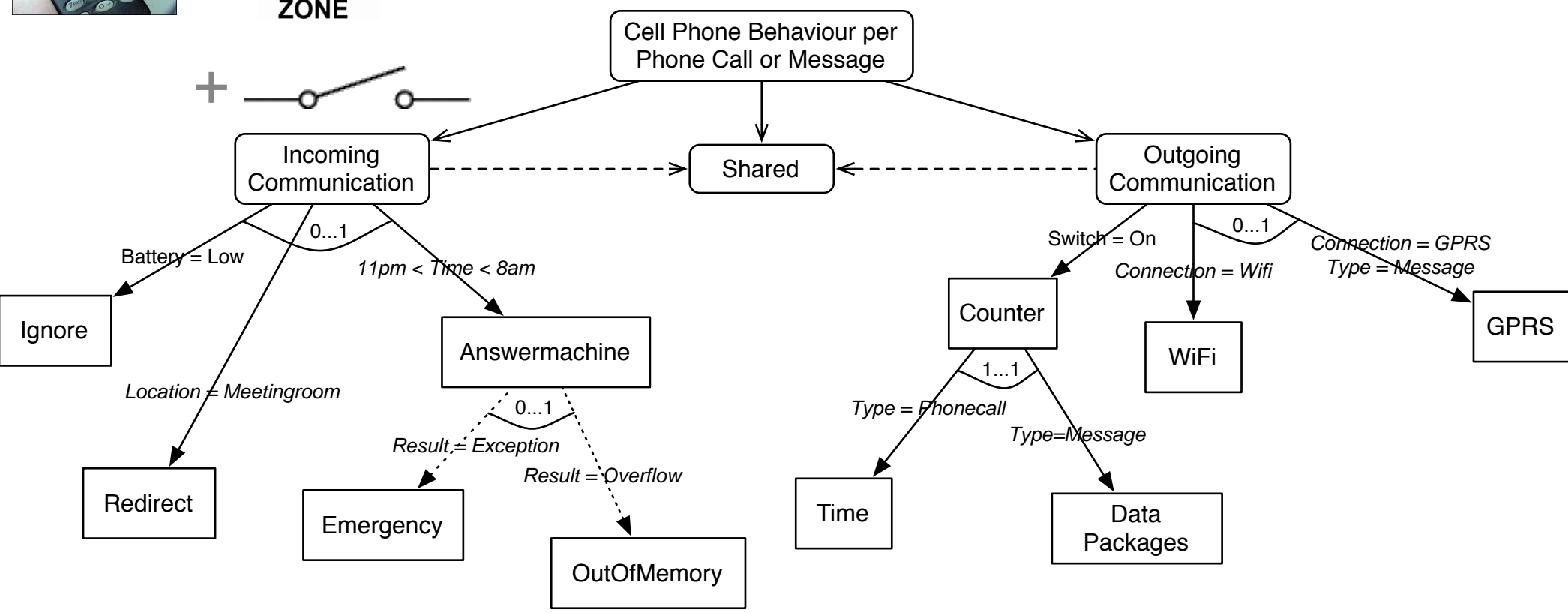
Switch = On

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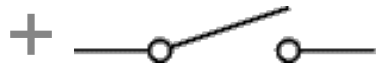
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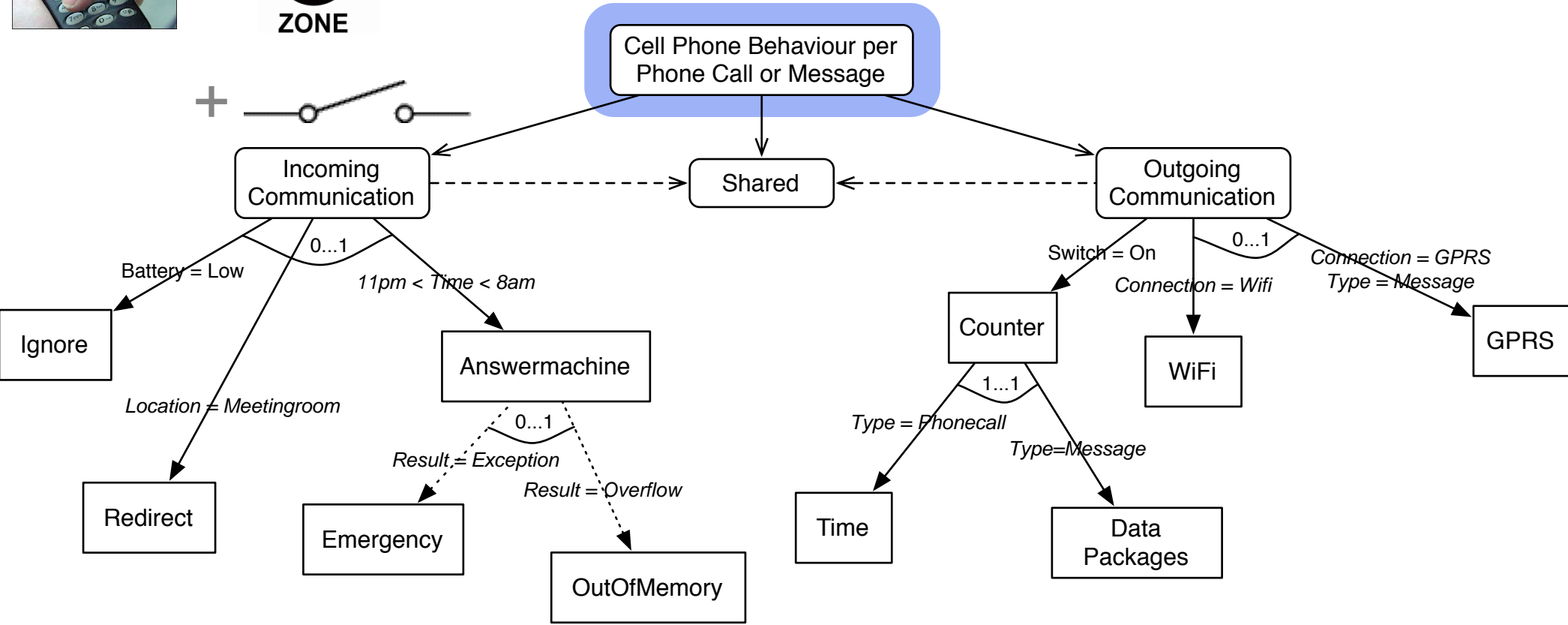
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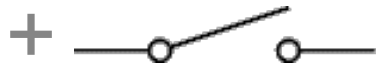
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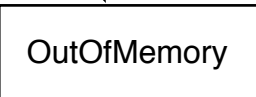
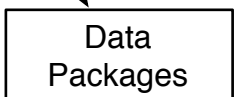
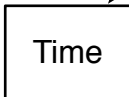
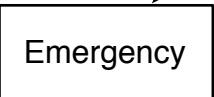
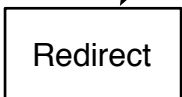
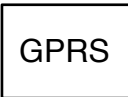
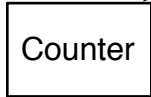
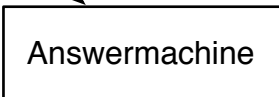
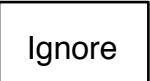
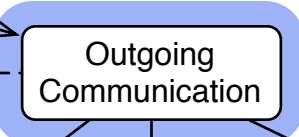
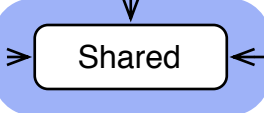
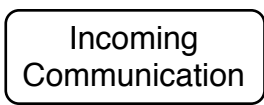
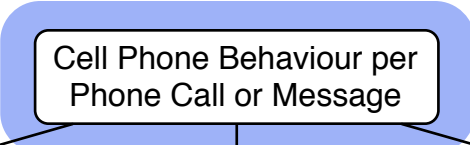
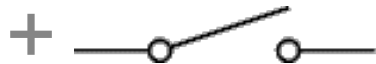
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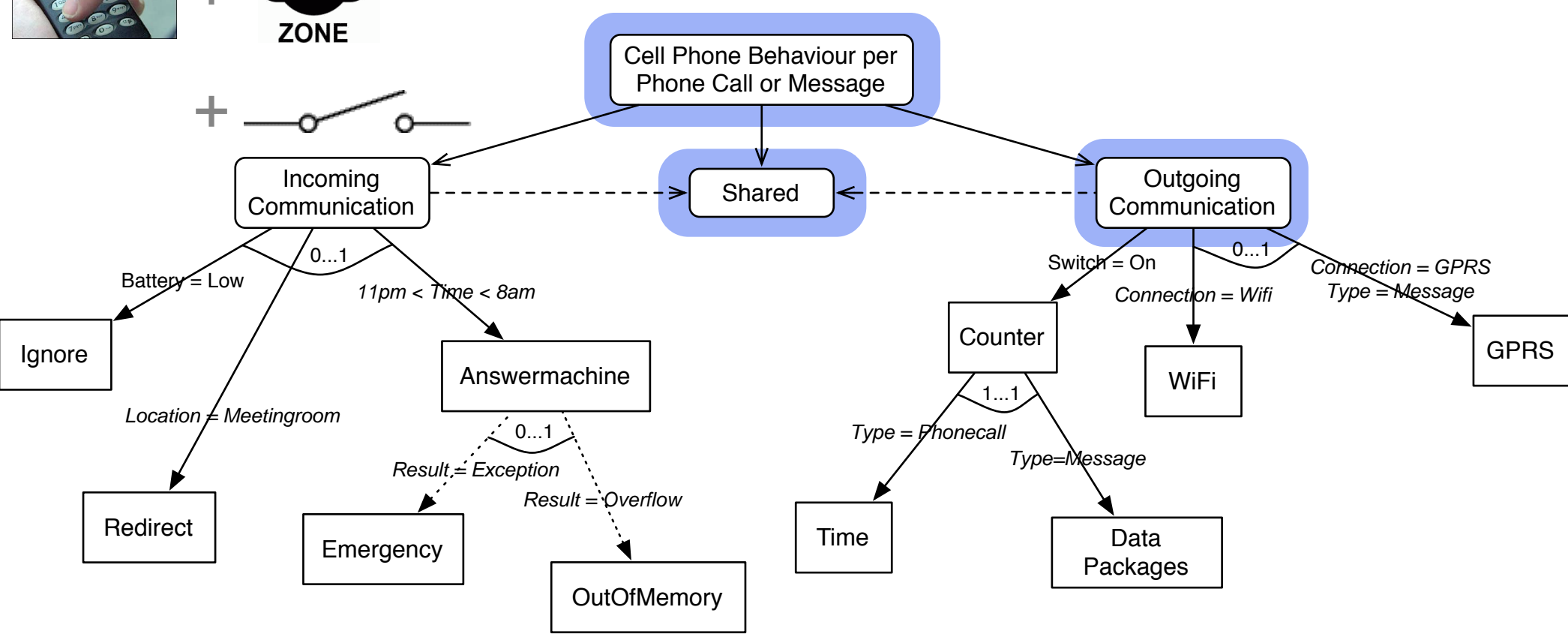
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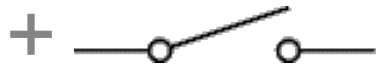
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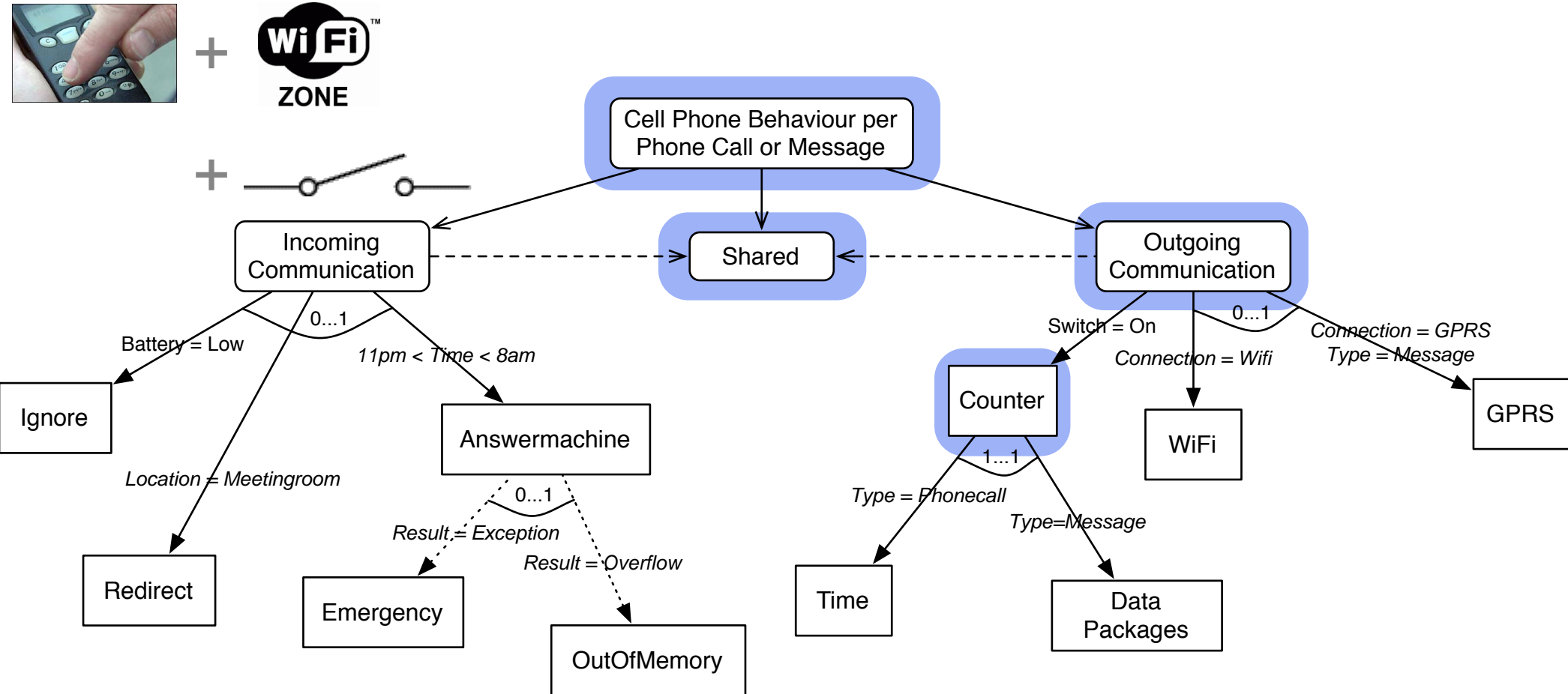
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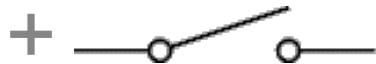
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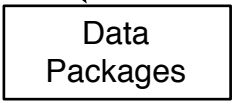
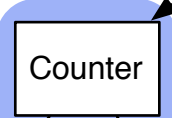
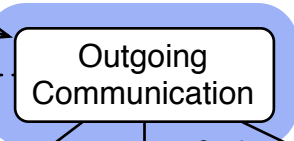
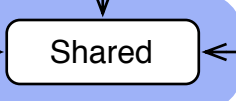
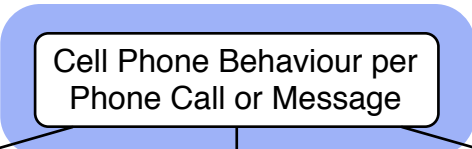
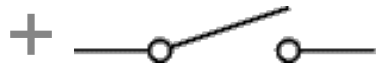
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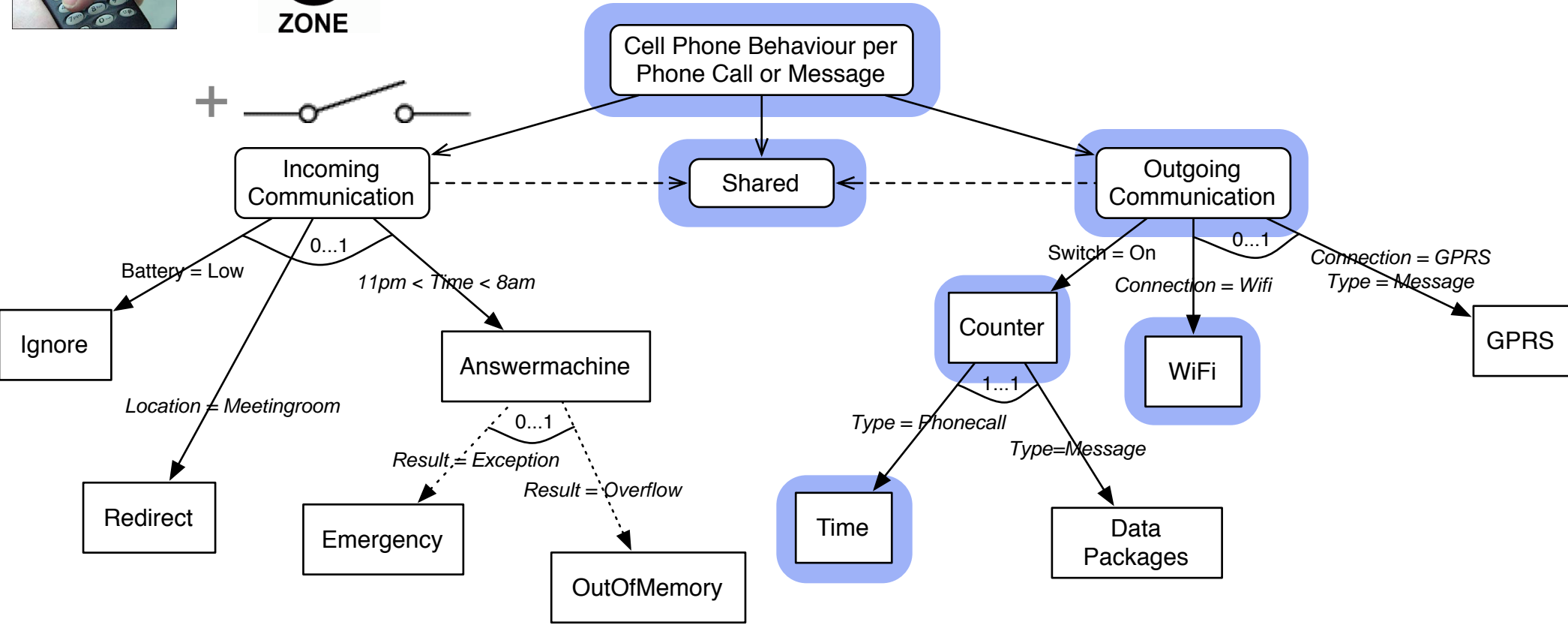
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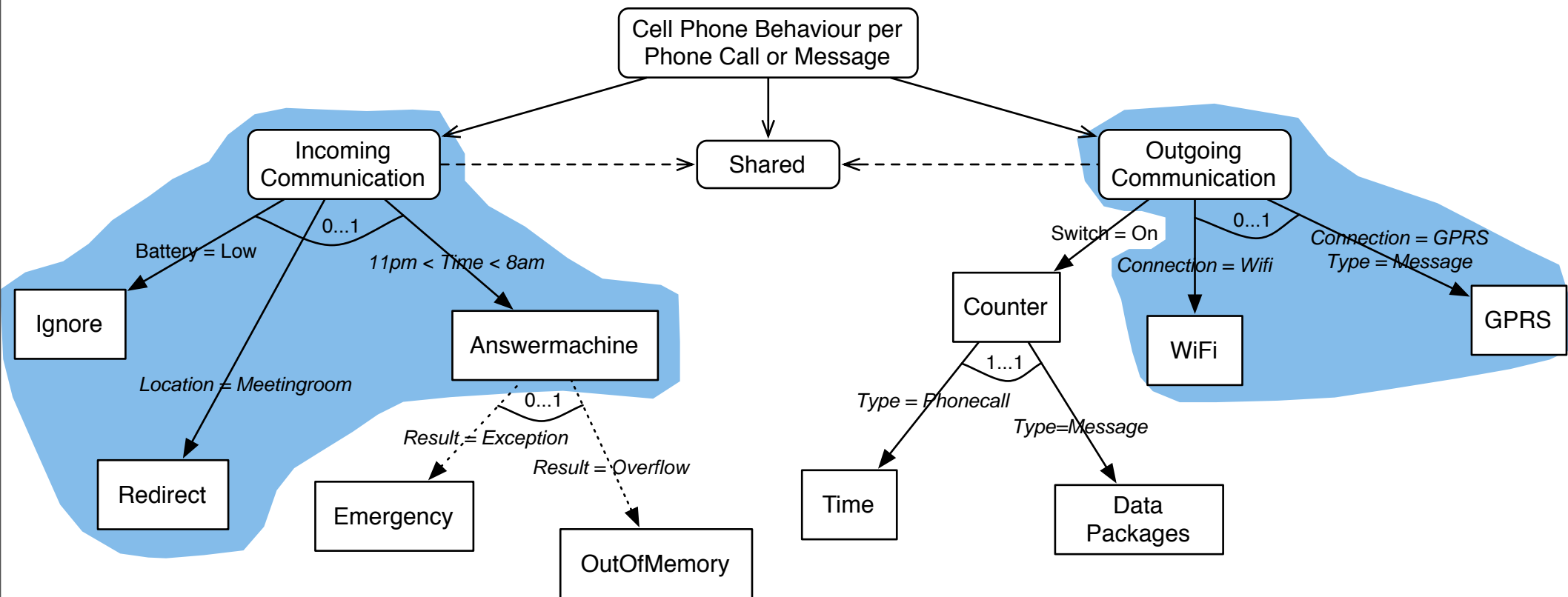
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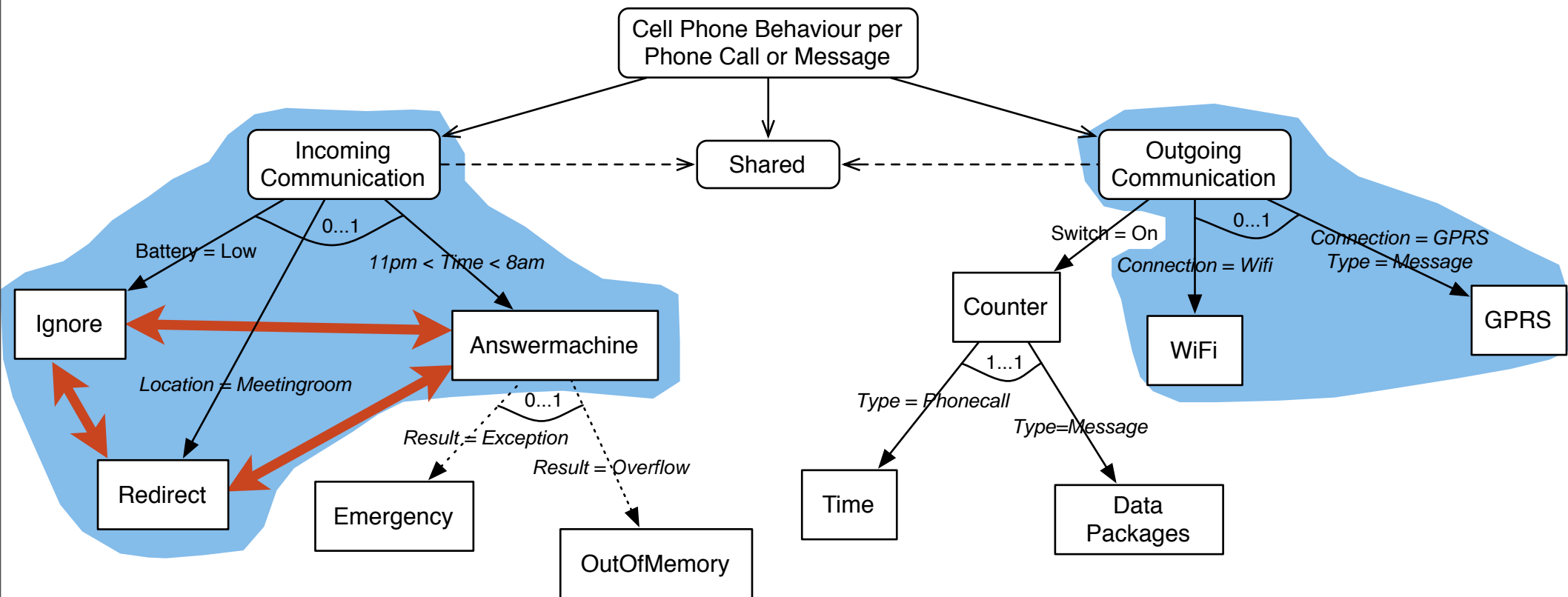
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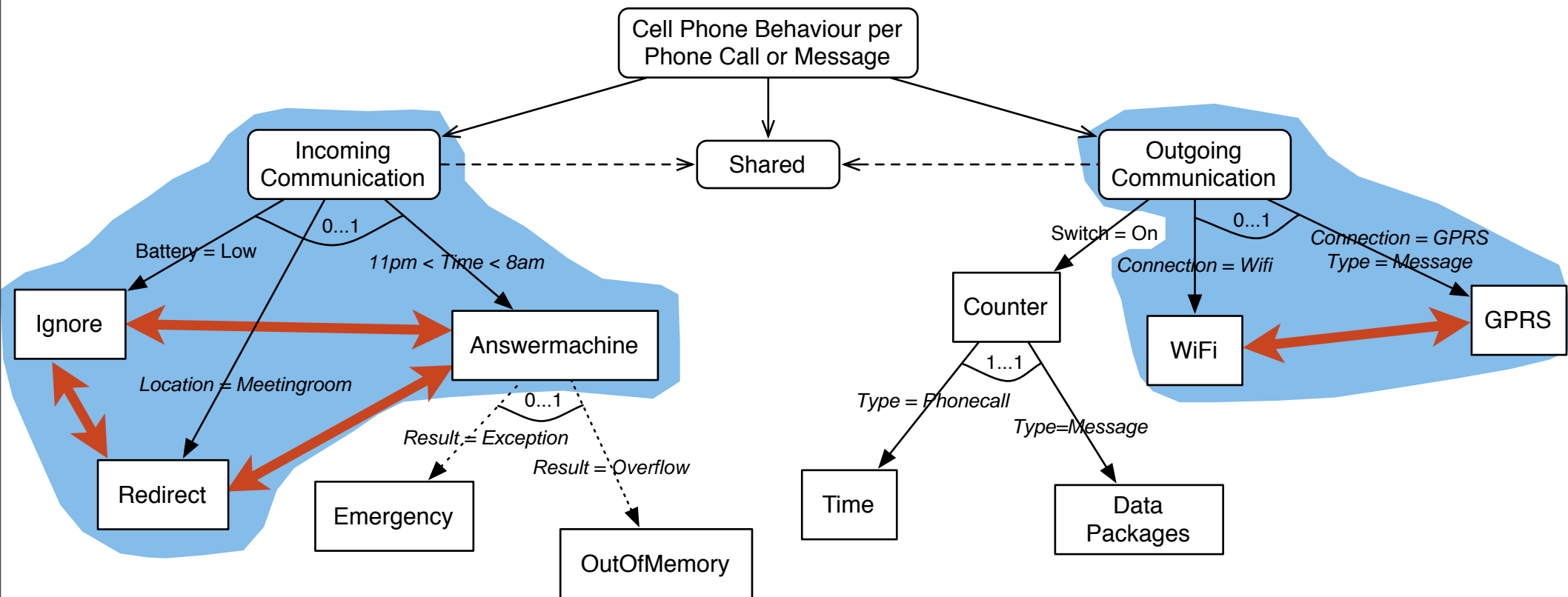
Interactions at choice points



Interactions at choice points



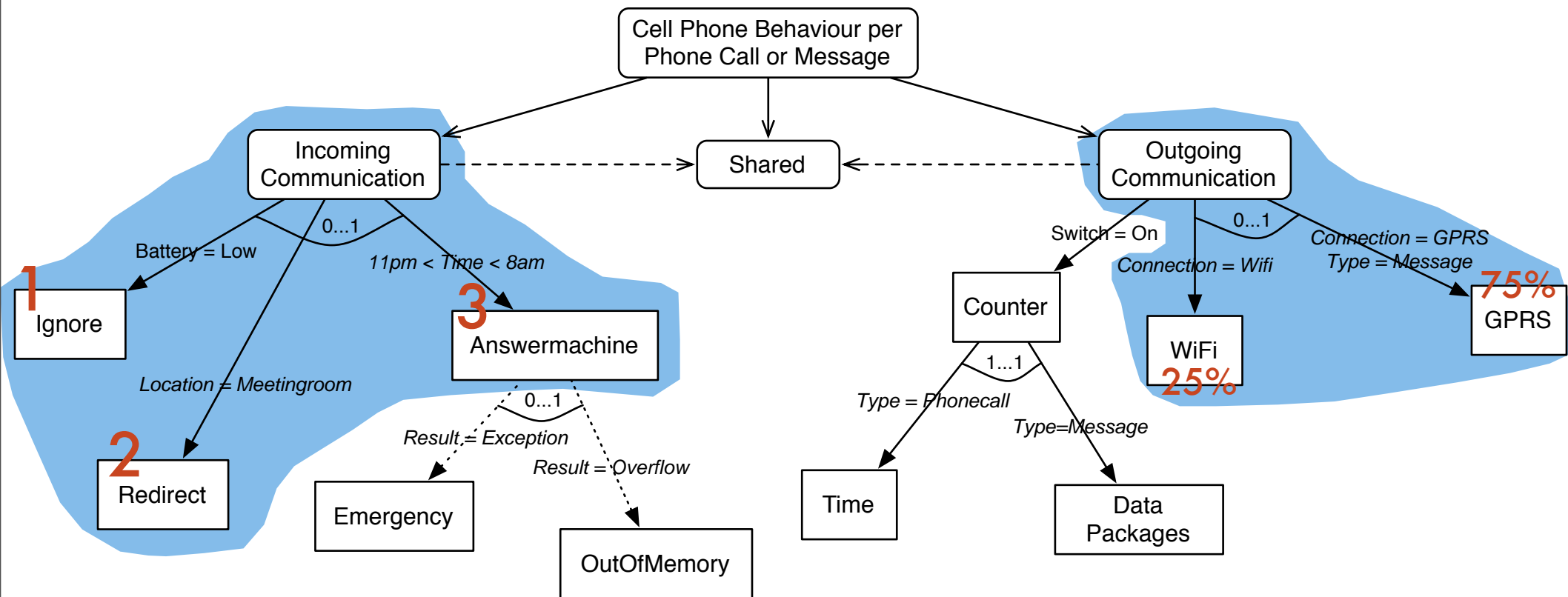
Interactions at choice points



Resolution strategies

Priority strategy

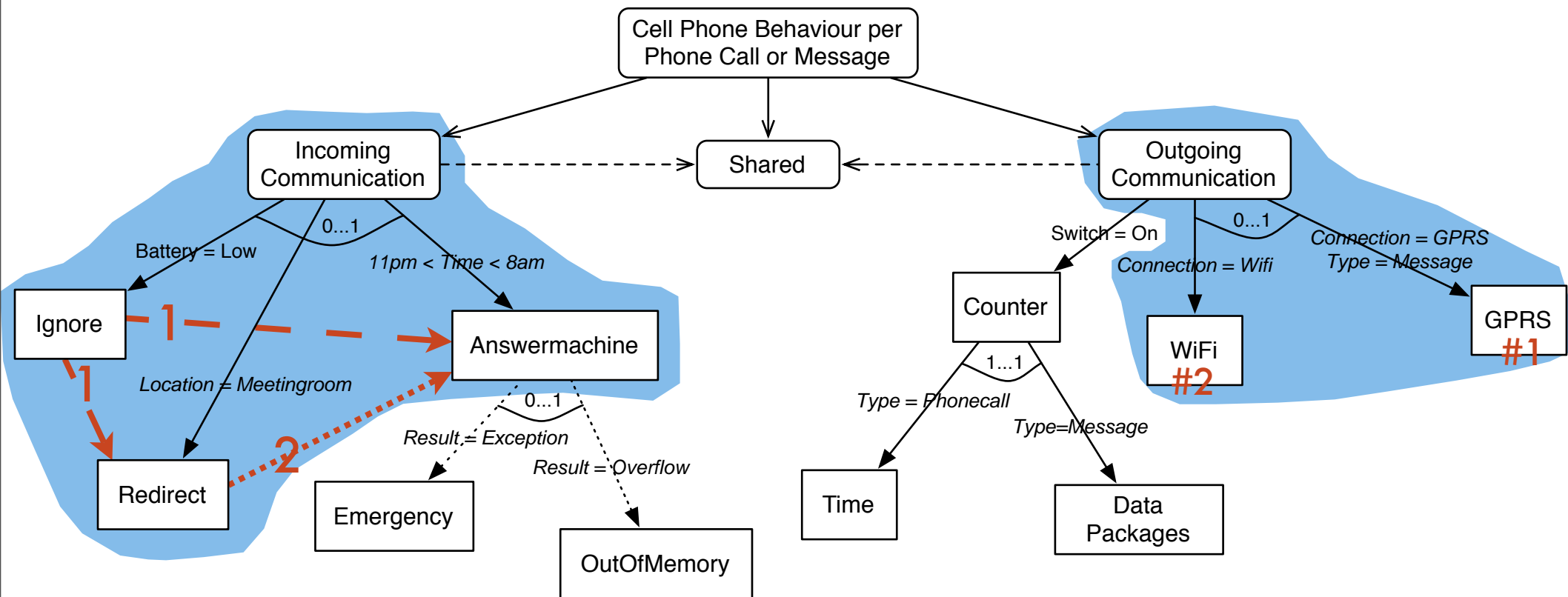
Frequency strategy



Resolution strategies

Case-by-case strategy

Timestamps strategy



Declarative language

- Textual representation of CODA
 - XML Documents
 - XML Schema Definition

```
<?xml version="1.0" encoding="UTF-8"?>
<codata xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="file:/Users/bdesmet/Documents/XML/coda.xsd">
  <properties>
    <title>CODA digram of context-aware cell phone</title>
    <author>Brecht Desmet</author>
    <date>2007-02-21</date>
  </properties>
  <basic-behaviour>
    <label>context-aware cell phone</label>
    <description>root node</description>
    <basic-behaviour id="sh01">
      <label>shared</label>
      <description>Maintains contact list and journal.</description>
    </basic-behaviour>
    <basic-behaviour>
      <label>incoming communication</label>
      <description>Accepting phone calls and messages.</description>
      <uses>sh01</uses>
      <choice type="inclusion" minOccurs="0" maxOccurs="1">
        <ctx-dep-adaptation id="adap01">
          <condition>
            <parameter>battery-level</parameter>
            <value>low</value>
          </condition>
          <adaptation>
            <label>ignore</label>
            <description>Ignore phone calls except for contacts classif
          </adaptation>
        </ctx-dep-adaptation>
        <ctx-dep-adaptation id="adap02">
          <condition>
```


Decision tables

- Formal semantics for CODA
- Not human-friendly
 - “enumeration”-like style
- Loss of intentions
- Scalability issues
- Do not capture advanced resolution strategies

Comparison FODA-CODA

	FODA	CODA
Goal	product-line development	context-aware systems
Concept	variations in product family	runtime variability in single system
Commons	shared behaviour of product family	context-unaware behaviour
Variabilities	features	context-dependent adaptations
Mode	static analysis	dynamic analysis

Future perspectives

- Extend CODA to support **event-driven** applications.
- Checking **correctness** and **completeness**.
- Mapping to **computational level**.

Thank you!

- Context-aware computing
- Modelling
- Language engineering