Overview and Parallel Processing for Business Artifacts with Declarative Lifecycles

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A Real Story – Visa Application

Problem:
How to handle flexibility?
How to include data?
Outline

- A Motivating Example
- Business Artifacts
- Declarative Lifecycle
  - Guard-Stage-Milestone Model
  - Semantics
- Parallel Processing
- Conclusion
Business Artifacts

Lifecycle model (process)

Information model (data)
**GSM in Details**

**Guard:**
- To open a stage

**Task:**
- Real task

**Stage:**
- A cluster of activities
- May be nested

**Milestone:**
- Business-relevant operational object
- Can be achieved or invalidated

**Terminator:**
- To close a stage
Example – Visa Application

- Interview Appointment
- Appointment Made
- Return Passport
- Returned By Mail
- Returned By Pick-up

- Visa Processing
- Material Submission
- Interview
- Process Suspended
- Process Completed

- if $\xi$
- on $E$
- on $E$ if $\xi$
Operational Semantics

**Visa Processing**
- Material Submission
  - Process Suspended (PS)
    - Ach: on Suspend
      - if residence ≠ “New York”
  - Process Completed
- Interview
- +AM
- +PS
- Re-Submit if PS

**App-Making**
- Appointment Made (AM)
  - on App-Making-Finish
    - Cannot be completed without Interview Appointment
  - Interview Appointment
    - on App-Making-Finish
  - +AM
    - event coming

**Returned**
- Returned By Mail
- Returned By Pick-up

**Interview Appointment**
- on App-Making-Finish
  - Appointment Made (AM)
    - on App-Making-Finish
    - Cannot be completed without Interview Appointment
Operational Semantics

- Interview Appointment
- on App-Making
- on Appointment Made (AM)
- Return Passport
- on Re-Submit if PS
- Returned By Mail
- Returned By Pick-up
- on Process Suspended (PS)
- Process Completed
- on Process Completed
- on Re-Submit if residence ≠ “New York”

Ach: on App-Making-Finish

Ach: on Suspend if residence ≠ “New York”
Operational Semantics

- **Interview Appointment**
  - on App-Making
  - Appointment Made (AM)
  - on App-Making-Finish

- **Return Passport**
  - Returned By Mail
  - Returned By Pick-up

- **Visa Processing**
  - Material Submission
  - Interview
  - Process Suspended (PS)
  - Process Completed

- **Ach:**
  - on App-Making-Finish
  - if PS
  - Suspend
  - if residence ≠ “New York”
A PDG should be acyclic
- The order of condition testing is the topological order of the PDG nodes

- Achi: on App-Making-Finish
- Process Suspended (PS)
  - Achi: on Suspend
    - if residence ≠ “New York”

- on App-Making (IA)
- on App-Making-Finish
- on +AM
- on Re-Submit if PS
- on +PS

- Appointment Made (AM)
- Visa Processing (VP)
- Interview Appointment (IA)

- +IA
- +PS
- +VP
- +AM

- -IA
- -PS
- -VP
- -AM

- on +AM
- on +PS

- Achi: on App-Making-Finish
- Process Suspended (PS)
  - Achi: on Suspend
    - if residence ≠ “New York”

- on App-Making (IA)
- on App-Making-Finish
- on +AM
- on Re-Submit if PS
- on +PS

- Appointment Made (AM)
- Visa Processing (VP)
- Interview Appointment (IA)

- +IA
- +PS
- +VP
- +AM

- -IA
- -PS
- -VP
- -AM
Operational Semantics

Event queue

Snapshot #4
Snapshot #3
Snapshot #2
Snapshot #1

IA  PS  AM  VP
The semantics is sequential *
  - Events are processed in a sequential pattern

Barcelona Prototype **
  - Each event may take about 3 to 5 seconds to process

What if hundreds of events arrive in a short time period?

Goal: Allow an arbitrary node to be tested for an arbitrary event!

* [E Damaggio et al, BPM 2011]
** [T Heath et al, BPM 2011]
Basic Idea

- Labeling
- Test reachable nodes only
When node $V$ can be tested for event $k$?

- $k$ is no greater than each number in node $V'$, where $V'$ is the “complement” of $V$
- For each node $U$, where $(U, V)$ is an edge
  - $k$ is smaller than each number in node $U$; and
  - $k$ is no greater than each number in node $U'$, where $U'$ is the complement of $U$
Process Events in Parallel*

CPU: 2 × 2.8 GHz
Memory: 4GB

The time consumed with log₂ base

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<th>Size of the model (number of stages and milestones)</th>
<th>Log(milliseconds)</th>
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<tbody>
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</tr>
<tr>
<td>3000</td>
<td>12</td>
</tr>
</tbody>
</table>

- Experiment not completed yet; and the cache of JEXL parser affects the results

* Experiment not completed yet; and the cache of JEXL parser affects the results
Many processes are becoming more flexible, data-driven, and human-driven.

Guard-Stage-Milestone Model influences the emerging OMG Case Management* standard substantially.

* To appear this November ideally...
Thanks

Q&A