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Capturing and Monitoring of Learning Process through a Business Process Management (BPM) Framework

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Capturing and Monitoring of Learning Process through a Business Process Management (BPM) Framework

- Introduction to Virtual Learning Environment (VLE)
- Current VLE Solutions
- Limitation in Current VLEs
- Business Process Management (BPM) Concepts
- Proposed BPM-Based VLE Solution
- Implementation Overview
- Monitoring Learning Process through Learning Path
- Conclusion and Future Work

Introduction to Virtual Learning Environment (VLE)

❑E-learning

- ➢Learning activities delivered in any electronic format.
- ➢It is becoming vital for distance education (complementary to the classroom environment).

❑Virtual learning environment (VLE)

- ➢It is a **software system** that best bring the materialisation of e-learning to fruition.
- ➢**Learning** must be the focal point of its implementation.
- ➢Any software system that implements a learning process must be **adaptive and flexible**.

Introduction to Virtual Learning Environment (VLE) cont.

❑Pedagogy and the role of technology

- Pedagogical structure is paramount in any established educational systems (formal or informal),
- The **role of technology** must be seen as a platform to realising such pedagogy.
- Compromise on education pedagogical structure due to technological deficit would be **detrimental to the expected learning outcomes**.

Current Virtual Learning Environment Solutions

❑Current VLEs (Commercial/Open Source)

- ➢Publishing of learning resources
- ➢Collaboration and communication (mailing lists, chat etc)
- ➢Evaluation process through Quiz, grades, scale, rates, survey, assignment etc
- ➢Online support for teachers and students
- ➢Complies with content packaging and aggregation standard i.e. Sharable Content Object Reference Model (SCORM)

Commercial vs Open Source

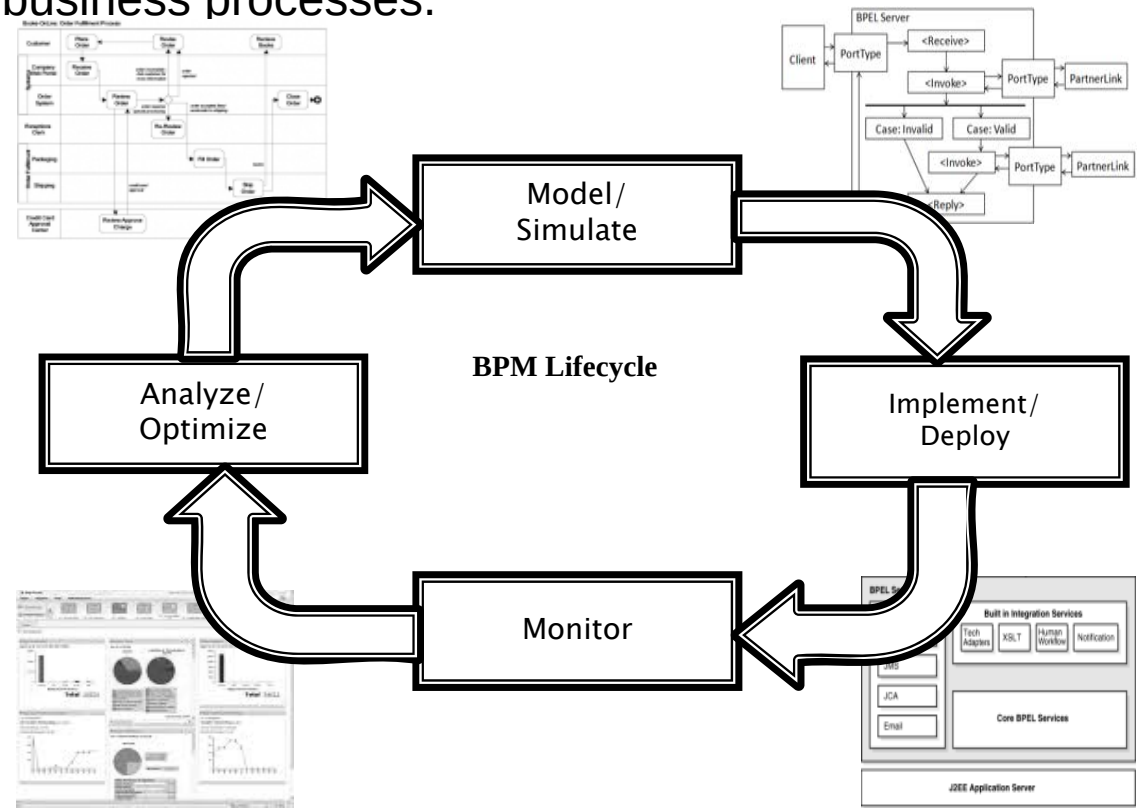
- ➢Commercial - Off the shelf products written externally = $$$
- ➢Open Source – Provides Relatively easy customisation but still requires an IT expert

Limitation in Current VLEs

- **"*ONE SIZE FITS ALL*"** approach to the **learning process** through the course materials
  - **Same learning path**, regardless of their a priori knowledge, learning requirements or learning disability.
- **Currently not possible to monitor the learning process** of individual learner or learning groups through the course material in real-time manner.
- Addressing these drawbacks with the **conceptual framework** of certain open source technologies, set a good foundation for the development of a future VLE.
- **Business Process Management** (BPM) concept is our conceptual framework.

Business Process Management (BPM) Concepts

- BPM technologies used by businesses to design, analyse, manage, optimize and adapt their business processes.



- BPM technologies are the official standards for workflow management system.

Proposed BBVLE Solution

- Technological choice can potentially determine the extent to which any VLE can best serve to implement any educational pedagogy.

- The purpose of exploring BPM technologies:

  - To manage **learning process in an automated manner**.

  - To introduce **human interaction** into a learning process workflow model.

- **Proposed BPM-Based VLE** (BBVLE) solution is a software system that uses BPM concepts and principles to enable the full learning process to be defined in a computer language

  - Allows an **adaptive and flexible learning process** through course material.

  - Allows course-writer **to monitor learner's learning process** in real-time.

  - Allows to **manually adapts** the learning path or course materials.

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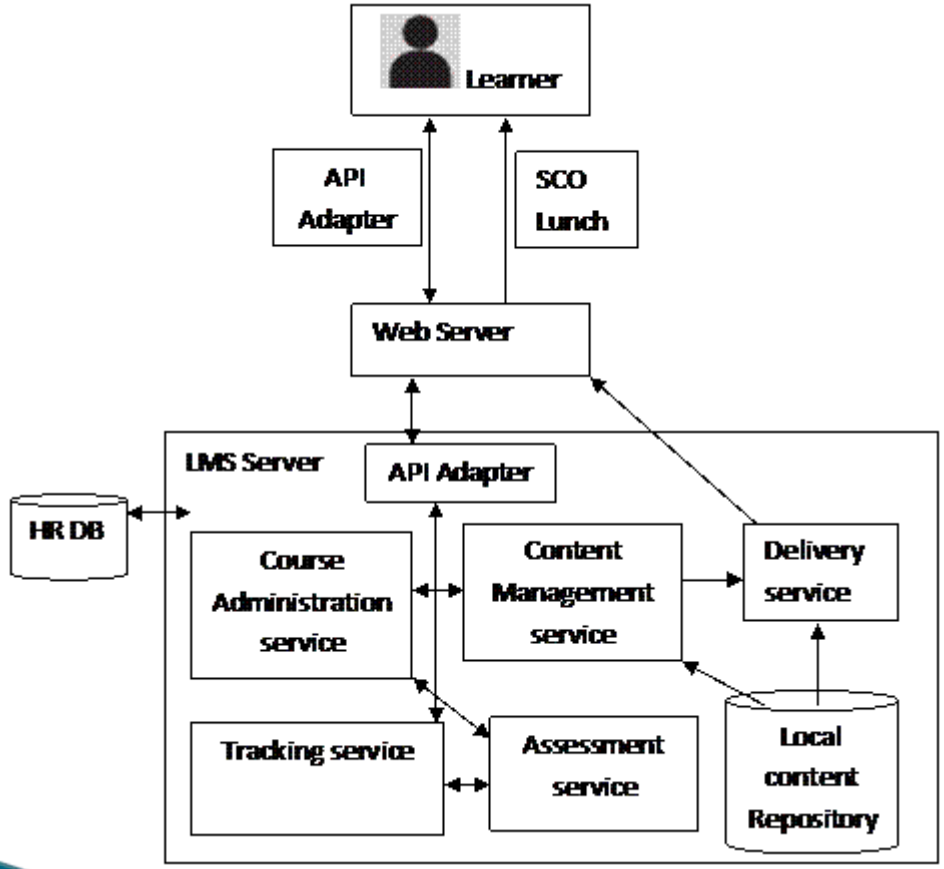
Implementation Overview

High level block diagram of a typical VLE



Typical An illustration of a SCORM compliant VLE.

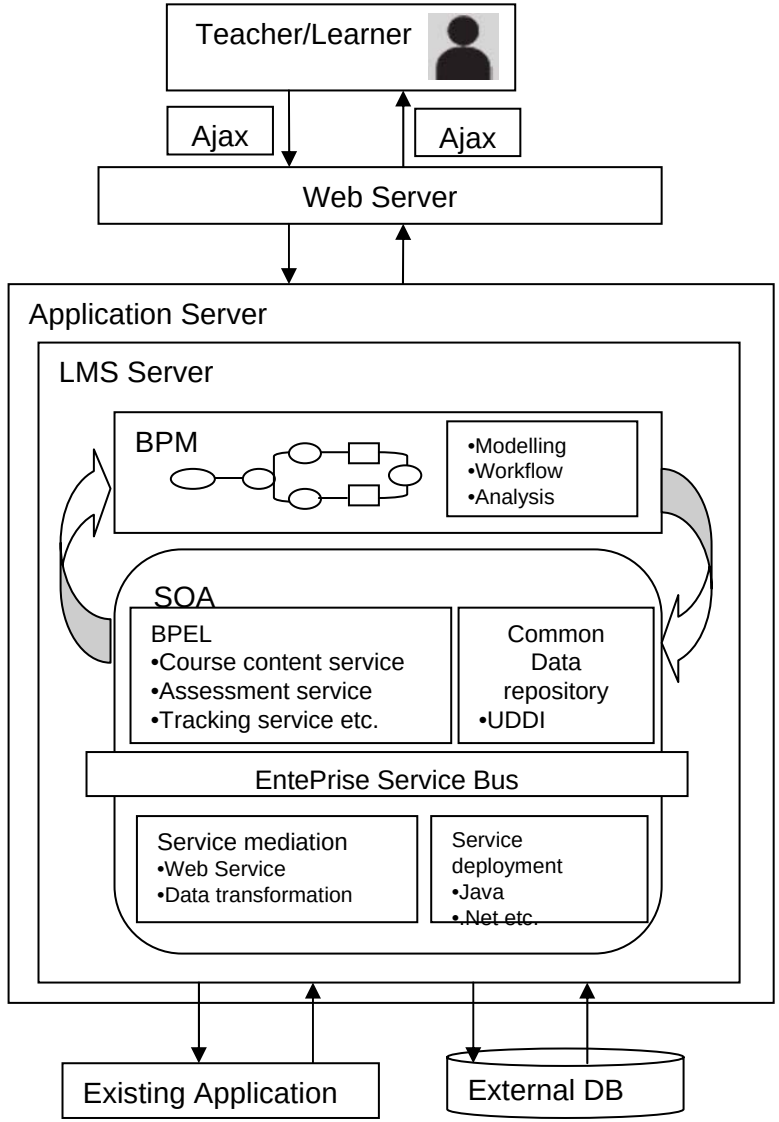


Illustration of Proposed BBVLE.

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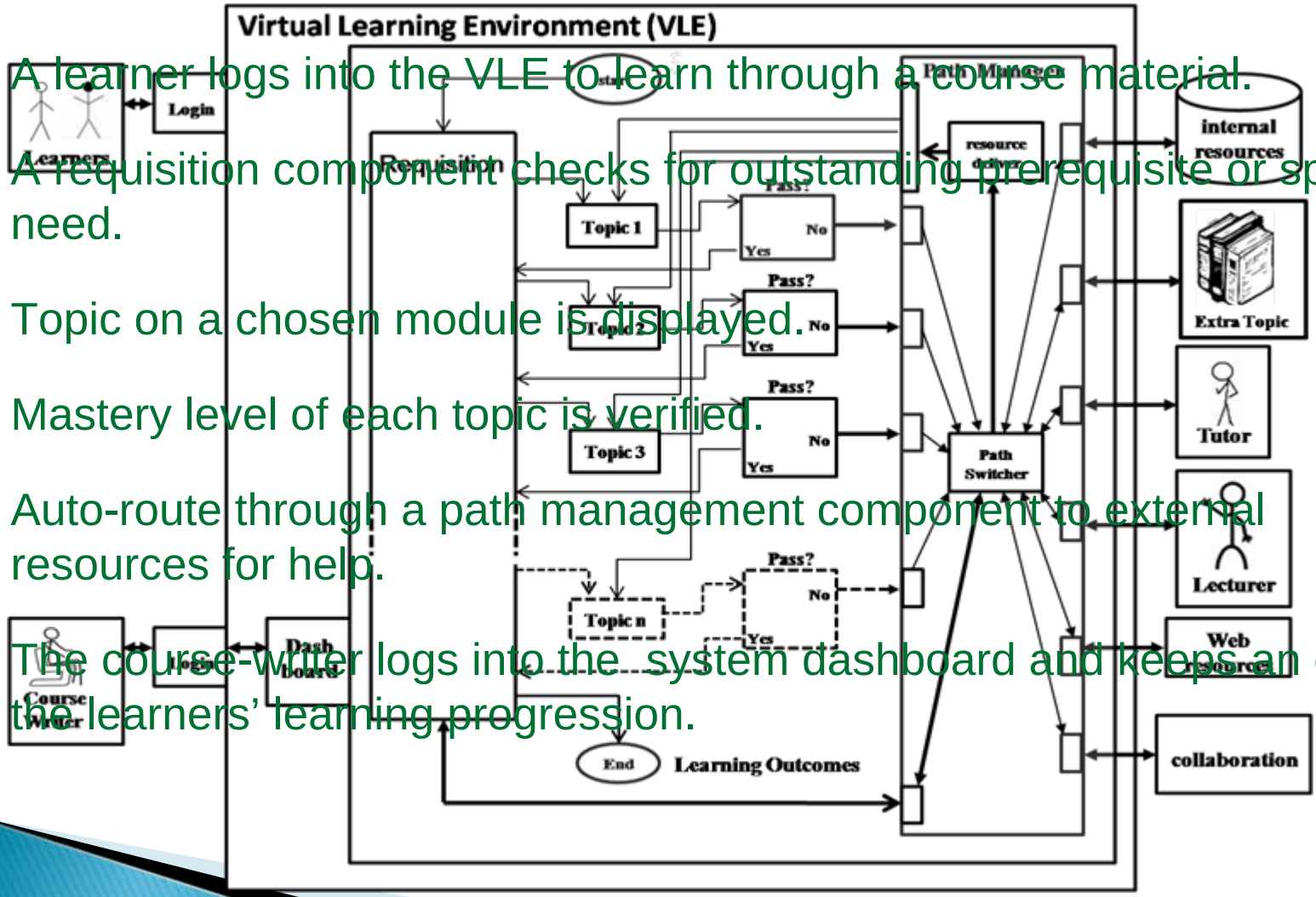
Implementation Overview Cont.

- A learner logs into the VLE to learn through a course material.
- A requisition component checks for outstanding prerequisite or special need.
- Topic on a chosen module is displayed.
- Mastery level of each topic is verified.
- Auto-route through a path management component to external resources for help.
- The course-writer logs into the system dashboard and keeps an eye on the learners' learning progression.

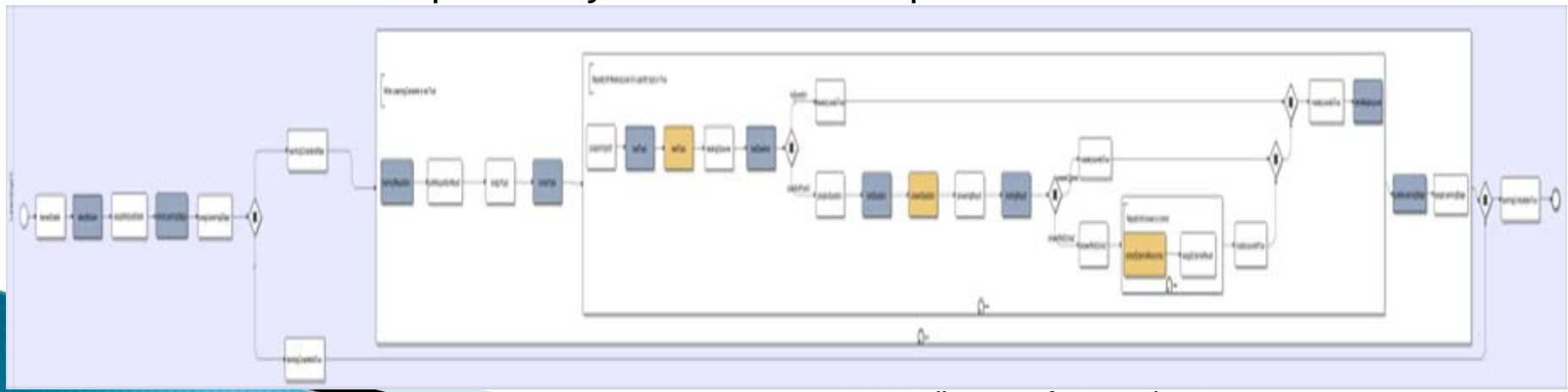


Diagrammatic Overview of Adaptive Learning Path

Implementation Overview Cont.

Mapping a learning process with Business Process Modelling Notation (BPMN)

- Eclipse BPMN Modeller is used to graphically represent the specifying learning processes in a workflow
- Why BPMN though?
  - Because at this stage all stakeholders can get involved in contributing to how the future learning process should take shape.
  - It is not specifically restricted to IT specialist.



BPMN diagram of a Learning Process

Implementation Overview Cont.

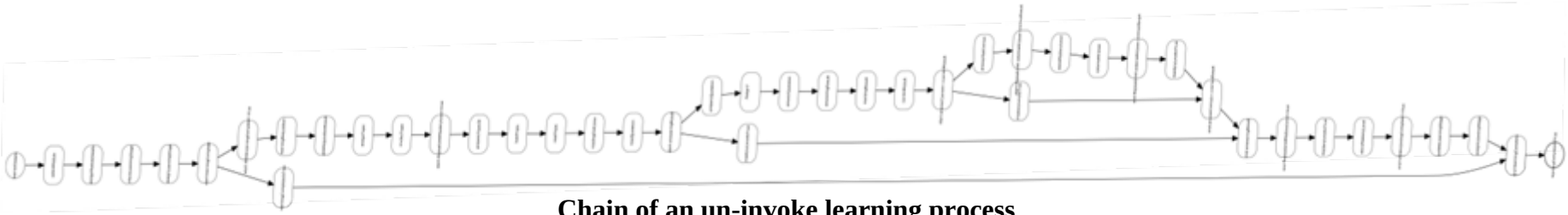
Transform BPMN to Executable Business Process Execution Language (BPEL)

- BPMN diagram is not executable.
- BPMN diagram of the learning process is transformed into BPEL.
  - Eclipse SOA Tool Platform (STP) Intermediate Model (IM) technology is employed.
  - A half baked BPEL process is generated from the IM.
- BPEL is completed with all necessary coding and the artefacts needed for deployment.
- BPEL is deployed unto BPEL engine where it can be accessed by any BPEL client.

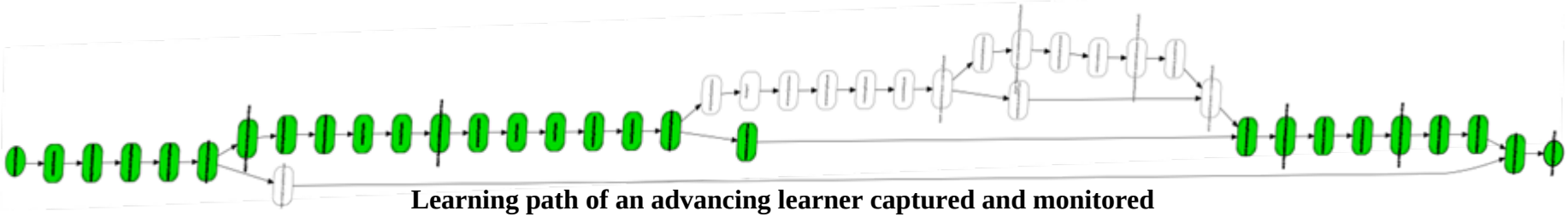
Fragmented BPEL version of BPMN Learning Process

Monitoring Learning Process through Learning Path

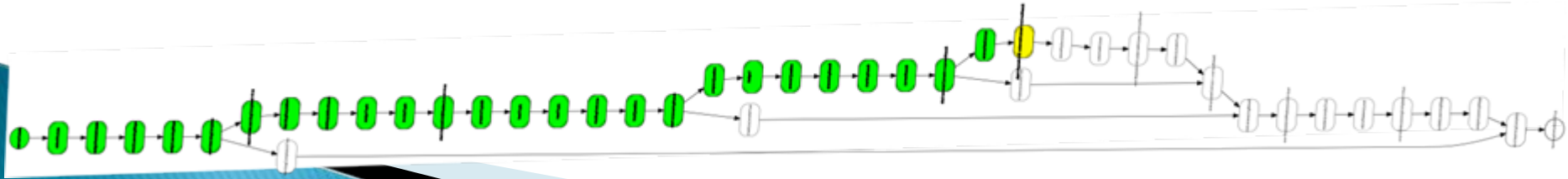
- To monitor the running BPEL, BPM dashboard/Business Activity Monitoring (BAM) is required.
- Open source Spagic BPM dashboard is used to monitor the deployed learning process BPEL.



Chain of an un-invoke learning process



Learning path of an advancing learner captured and monitored



Learning path of a struggling learner captured and monitored

Conclusion and Future Work

- This presentation presents an approach to model, analyse, detect and monitor a learning process through a course material.
- The Modelling and analysing of learning process using BPMN.
- The execution of semantic web services orchestration with BPEL.
- The monitoring of learning process in real time manner using Spagic BPM dashboard.

Future Work

- Several areas of the composition such as learners' prior knowledge, learning requirements or learning disability were abstracted
- Needs a complete and extensible workflow solution by extending the BPEL4People construct and XForms technologies.
- Implementation of areas of assumptions