JBatch with Apache BatchEE

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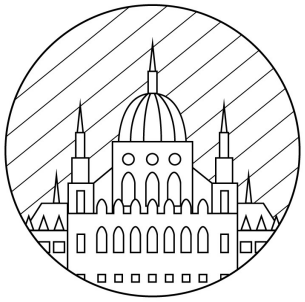
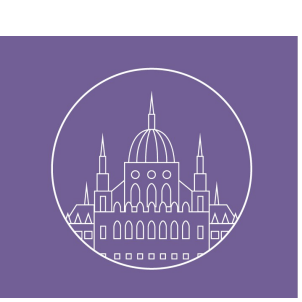


About the Speakers

- http://github.com/struberg
- http://people.apache.org/~struberg
- Apache Software Foundation member
- Apache OpenWebBeans, MyFaces, BVal, OpenJPA, Maven, DeltaSpike, BatchEE, ...
- Java EG member

Agenda

- JBatch and Apache BatchEE
- JBatch Terms and Ideas
- Writing a simple Batch
- Threading and Transactions
- JBatch Execution Environments
- BatchEE add-ons



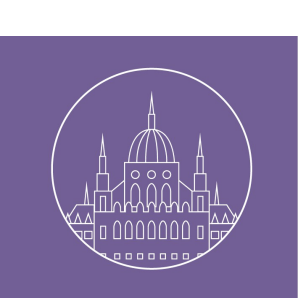
About Apache BatchEE

- Apache Incubator Project since 2013-10
- Homepage:
  http://batchee.incubator.apache.org
- Source:
  git://git.apache.org/incubator-batchee.git
- dev@batchee.incubator.apache.org
- irc.freenode.net channel #apache-batchee
- https://issues.apache.org/jira/browse/BATCHEE

Diff JBatch and BatchEE

- JBatch
  - The specification
  - The RI
- BatchEE
  - includes forked and bug-fixed RI code for Java EE
  - adds tons of features on top of it:
  - different SPI implementations
  - various ItemReader and Writer,
  - JAX-RS and simple Job UI,
  - Standalone Java EE Batch Environment


JBatch Basics



What is JBatch

- A Java EE specification, JSR-352
  - https://jcp.org/en/jsr/detail?id=352
- Inspired by WebSphere-Batch, Spring-Batch, JES, JCL, ...
- To **write** and **execute** Java Batches
- Why do I need Batches ?
  - Migration
  - Bulk Import/Export
  - Mass processing

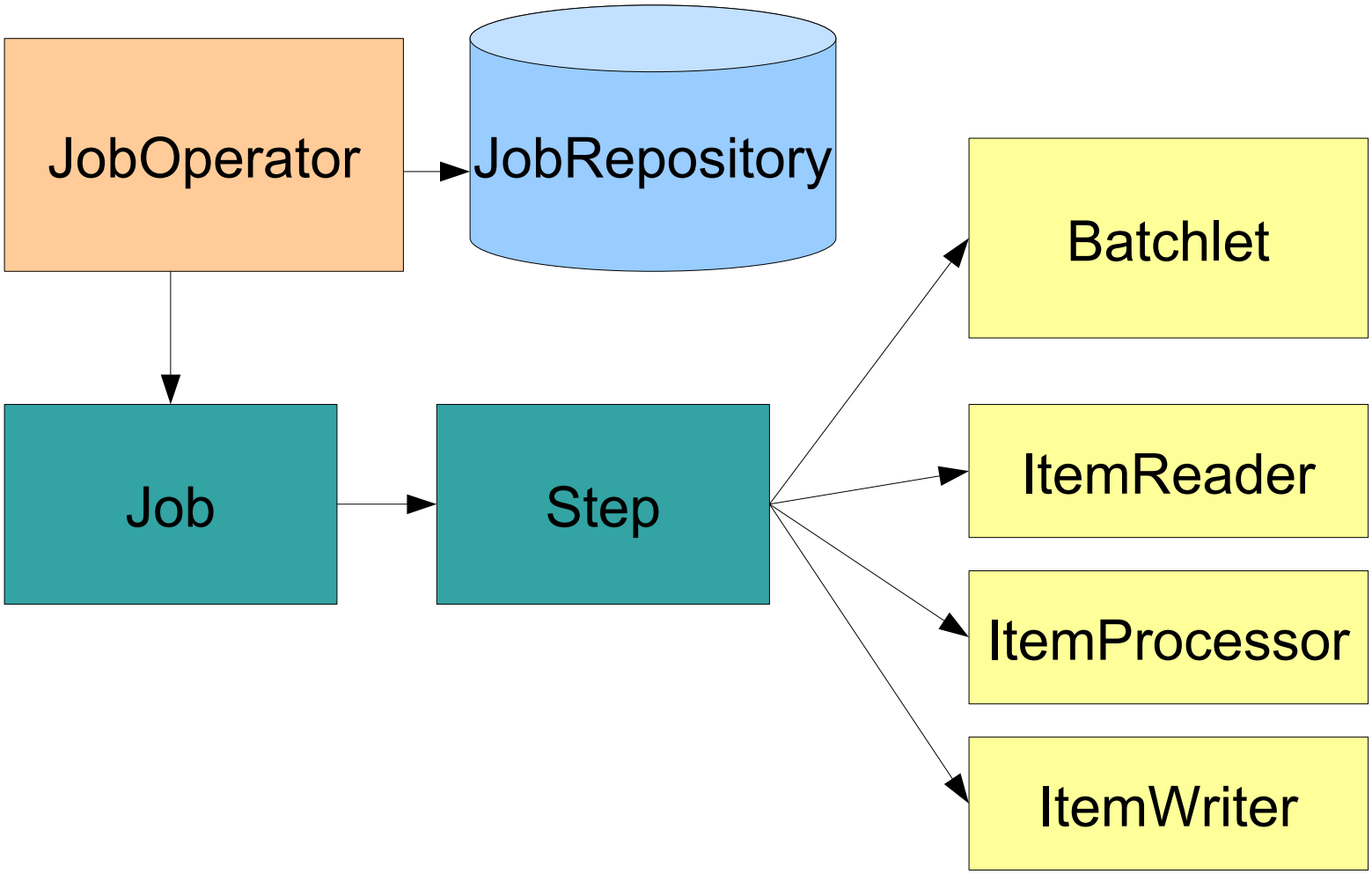
Batch Classification

- Online vs Offline Tasks
- Bulk vs On-demand Batches
- Synchronous vs Asynchronous processing

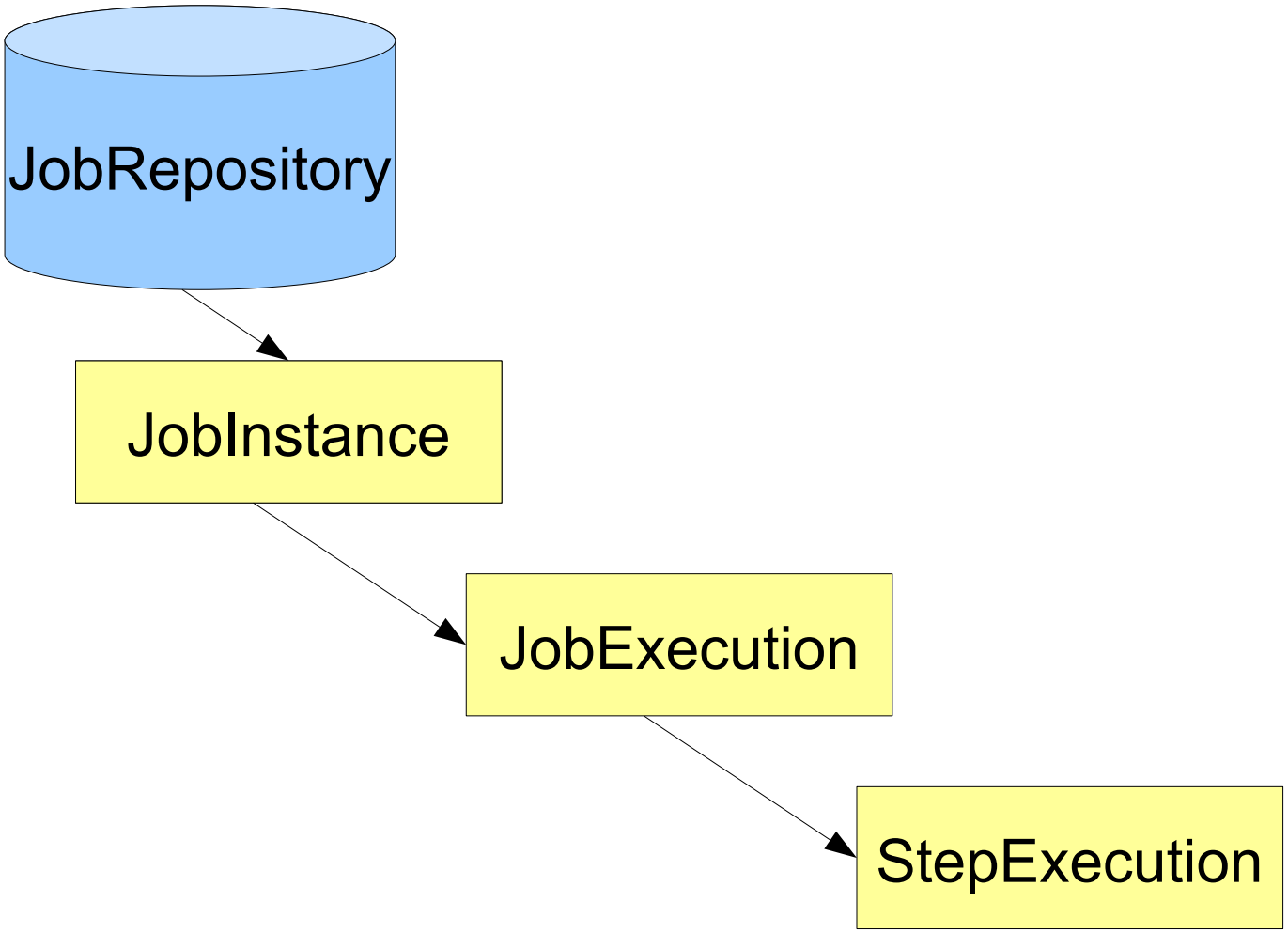
Benefits of JBatch Spec

- improved maintainability
- improved portability
- reuse of existing app components
- out-of-the-box monitoring and control

JBatch Architecture



JobRepository



Batch JSL

- JSL: Job Specification Language
- META-INF/batch-jobs/*.xml

```
<job id="myjob" restartable="false">
  <step id="firststep">
    <chunk item-count="1">
      <reader ref="myReader"/>
      <processor ref="myProcessor"/>
      <writer ref="myWriter"/>
    </chunk>
  </step>
</job>
```

Batch Artifact Loading

- Available as @Named CDI beans
- Or as class names
- Registered via META-INF/batch.xml

Batch Properties (1/2)

- Defined In JSL:

```
<properties>
  <property name="myProp" value="myVal"/>
</properties>
```

- for:
  - <job>
  - <reader>, <processor>, <writer>
  - <batchlet>
- Dynamically via JobOperator

Batch Properties (2/2)

- Usage in Code via
- `JobContext#getProperties();`
- `StepContext#getProperties();`
- `@Inject @BatchProperty("myProp") String val;`
- Can leverage Expression Language:

```
<property name="csvFile"
  value="#{jobProperties['infile.name']}"/>
<property name="jobDay"
  value="#{partitionPlan['schedule.day']}"/>
```

Basic Step Structure

- Batchlet or
- ItemReader, plus
- ItemProcessor (optional), plus
- ItemWriter
- Steps can form Sequence Flows
- Steps can use Partitioning and Splits
  - each Partition gets an own Thread

Batchlet

- performs all the processing in one go
  - `Batchlet#process()`
  - `Batchlet#stop()`
- Return the exit status of the batch

ItemReader

- Read single Item for a chunk step
- Can set and read 'Checkpoints'
- `readItem()` invoked until `null` returned

BatchEE TypedItemReader

- <R, C> version of ItemReader
  - R: Type of item to Read
  - C: Type of Checkpoint (? extends Serializable)
- <R> NoStateTypedItemReader
- <R> BufferedItemReader

ItemProcessor

- Optional!
- Processes the read item
- Returning `null` will skip the item

BatchEE TypedItemProcessor

- <I, O> version of ItemProcessor
  - I: Type of item input
  - O: Type of Output

ItemWriter

- Writes n items (according to chunk-size)
- Each writeItems is an own Transaction
- Can set and read 'Checkpoints'

BatchEE TypedItemWriter

- <W, C> version of ItemWriter
  - W: Type of item to Write
  - C: Type of Checkpoint (? extends Serializable)
- <R> NoStateTypedItemWriter

Batch Transaction Handling

- JBatch uses JTA by default
- JTA TX is always per Thread in Java
- Each 'Split' Partition has an own Transaction
- Commit packages can be set via chunk-size

Batch Chunks

- chunk-size=100 means
  - beginTransaction();
  - 100x ItemReader#readItem();
  - (optional) 100x ItemProcessor#processItem();
  - 1x ItemWriter#writeItems(all100);
  - commit();

Chunk Exception Handling

- default: abort w FAILED on Exception
- possible to define Exceptions for:
  - retry <retryable-exception-classes>
    plus optionally: Retry*Listener
  - skip <skippable-exception-classes>
    plus optionally: Skip*Listener
  - Retry is always done with item-count=1
  - Retry precedes Skip

The JobOperator

- THE central interface to communicate with the Batch Runtime
- can start, stop and restart Jobs
- can list Jobs

Batch Listener

- JobListener
  - `beforeJob()`
  - `afterJob()`
- StepListener
  - `beforeStep()`
  - `afterStep()`
- e.g. for setting up Authentication
- e.g. for starting CDI Contexts


BatchEE SPI

BatchEE SPI activation

- batchee.properties
  - `BatchThreadPoolService=....`
- SecurityService
- PersistenceManagerService
- BatchThreadPoolService
- TransactionManagementService
- http://batchee.incubator.apache.org/configuration.html

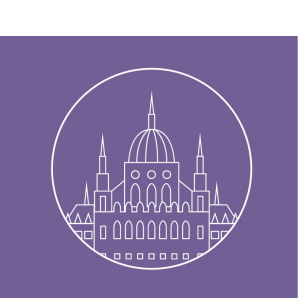

Batch Environments

Batch WAR

- BatchEE Servlet
- UI for
  - showing status
  - creating Jobs
  - starting Jobs

JAX-RS Integration

- Exposes JobOperator via JAX-RS
- Allows to start Jobs from UC4, JES, etc
- We also have 'simple-rest'
  - http://localhost/myApp/jbatch/rest/start/mybatch?param1=val1&param2=val2
  - http://localhost/myApp/jbatch/rest/status/${execId}



CLI Batch

- We introduced our own BAR format

```
BATCH-INF
+-- batch-jobs/*.xml
+-- classes/..
+-- lib/..
```

- `$> java -jar batchee-cli.jar start \ -archive demo-1.0.bar -name mybatch`

CDI Batch Scopes

- @StepScoped
- @JobScoped
- technically done via StepListener and JobListener

Clustering

- TODO... it's just not yet done...
- ... helping hands are welcome...

Legal stuff

- Apache, BatchEE, OpenWebBeans, OpenEJB, TomEE and OpenJPA are trademarks of the Apache Software Foundation