Challenges in Providing a Semi-Connected Learner Experience with xAPI

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xAPI & Semi-connected Learners

Challenges in Providing a Semi-connected Learner Experience with the Experience API (xAPI)

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Semi-connected

Sometimes I have an Internet access
Semi-connected
To maximize interoperability of services which create, gather, store and process information about learning experiences.
Local LRS
Local LRS
Local LRS

• Worked great for statements—easily queued and batch

• Challenging for documents (e.g. activity state documents)
Problems encountered

1. Unable to batch updates to document-based APIs
2. Disagreement on how to merge docs
3. Unhelpful concurrency controls
1. Unable to batch updates for documents

- The xAPI spec does not offer APIs for performing batch updates or retrievals of documents
- Requires sending multiple API requests to get back in sync
- Easily overrun API rate limits imposed by some LRS vendors
API requests per minute

400

8 courses
25 state updates / course
1 user

200 API requests
400
API requests per minute

8 courses
1 state update / course
2 users

16
API requests
2. Disagreement on how to merge docs

{ 
  "x": "foo",
  "y": "bar"
}

+  
{ 
  "x": "bash",
  "z": "faz"
}

=  
{ 
  "x": "bash",
  "y": "bar",
  "z": "faz"
}
2. Disagreement on how to merge docs

\[
\begin{align*}
[ &
  \{ \\
    "id" : 1, \\
    "done" : true
  \} \\
  ] \quad + & \quad [ \\
  \{ \\
    "id" : 2, \\
    "done" : true
  \} \\
  ] \quad = \quad ??
\end{align*}
\]
2. Disagreement on how to merge docs

```
[ 
  { 
    "id" : 1, 
    "done" : true 
  }
] 
+ 
[ 
  { 
    "id" : 2, 
    "done" : true 
  }
] 
= 
[ 
  { 
    "id" : 1, 
    "done" : true 
  },
  { 
    "id" : 2, 
    "done" : true 
  }
] 
```
3. Unhelpful concurrency controls

How do I know if my cache is up-to-date?
3. Unhelpful concurrency controls

- Unable to quickly check on the status of multiple documents
- Unable to check the status of a single document without downloading it
3. Unhelpful concurrency controls

Optimistically choose the device as source of truth
Recommendations

1. Add API for batch retrieval or updating of documents
2. Clarify how to merge JSON arrays
3. Require the LRS to return 304 Not Modified if document is GET with If-None-Match
4. Require the LRS to provide a "collection" ETag for all document resources
Questions?
Thank you!

More about Float: gowithfloat.com
More about xAPI: xapi.com
xAPI spec: github.com/adlnet/xAPI-Spec

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