REST APIs:
Build, embed, and extend custom applications with MicroStrategy’s REST APIs
Loïc Fabro, Director, Product Management
REST APIs: Build, embed, and extend custom applications with MicroStrategy’s REST APIs

Loïc Fabro
Director, Product Management

• What is Embedded Analytics?
• Embedding, integrating, and extending with MicroStrategy REST APIs.
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Key Technology Investment Areas
Agile enterprise analytics that span all ecosystems and users

Agility for business
- Simple UX
- Smart data discovery
- Easy Cloud deployment
- Predictive Analytics
- Collaboration
- Consume IT-built analytic applications

Enterprise scale and governance
- Build enterprise apps using RSDs
- Optimized for real time and Big Data
- Data modeling and governance with project schema
- Simplified deployment and upgrade
- Hybrid cloud and on-premise

Open to the ecosystem
- Integrate with best of breed for advanced analytics
- Embrace Hadoop ecosystem
- Enable 3rd party use of MicroStrategy data
- Enable new scenarios - real-time and big data
- Connectivity to a variety of data assets
Key Technology Investment Areas
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"Embedded analytics is the use of reporting and analytic capabilities in transactional business applications. These capabilities can reside outside the application, reusing the analytic infrastructure built by many enterprises, but must be easily accessible from inside the application, without forcing users to switch between systems. The integration of a business intelligence (BI) platform with the application architecture will enable users to choose where in the business process the analytics should be embedded."

Gartner’s definition of embedded analytics
## Three Key Target Scenarios to Support Embedded Analytics

### Embed MicroStrategy content into custom applications and workflows
- Embed MicroStrategy content into a web page or application
- Embed data from MicroStrategy into an application
- Leverage MicroStrategy capabilities (SSO, Folders, …) in an application
- White label MicroStrategy functionalities

### Integrate MicroStrategy platform into a custom product offering
- Automated deployment and upgrade of a MicroStrategy environment
- Programmatic user and security management
- Updating MicroStrategy cube data from 3rd party applications/workflows
- Programmatic object management

### Extend MicroStrategy capabilities with 3rd party functionality (and vice versa)
- Connect to new sources
- Add new visualizations
- Add new workflows
- Push new data and metadata
- Pull data from MicroStrategy and process it in other systems (e.g. Machine Learning)
Embedded Analytics
Legacy embedding with MicroStrategy

MicroStrategy Web has been the flag ship technology foundation for everything embedded:

• Single Sign-On (External Security Module / Custom task for Mobile login)
• Embedding MicroStrategy Objects (Folders, Grids, Graphs, Report Services Documents, etc.)
• Portal Integration Kit (SharePoint, WebSphere Portal, SAP NetWeaver, Liferay, DotNetNuke [DDN CMS], etc.)
• Embedding data (MicroStrategy Tasks / Web Services / JSON / XML)
Embedded Analytics
Updated MicroStrategy technology stack

Since MicroStrategy 10.4, additional options have been introduced with a different, more modern, technology stack leveraging recent industry standards:

- REST APIs (HTTP, JSON)
- Embedding API (JavaScript)
Native RESTful API Support in the MicroStrategy Platform

Enabling the open ecosystem

Before MicroStrategy 10.4, Web services leverage:

- XML or JSON Data Structure
- SOAP or MicroStrategy proprietary tasks (RPC over HTTP).

The new generation of MicroStrategy Web Services leverages

- JSON Data Structure
- RESTful APIs (over HTTP)
- New REST API Server component
The MicroStrategy RESTful API Server is self-documented/documenting:

- JSON file contains the definition of the public REST APIs.
- Web UI to see and interact with the REST APIs is https://yourserver.domain/DeployedAppName/api-docs/

Example:

http://dexters.labs.microstrategy.com:8080/MicroStrategyLibrary/api-docs/
MicroStrategy Data as a Service: Cubes and Reports REST API

MicroStrategy-powered applications

Data API
- Easy-to-use REST API to get content from MicroStrategy Cubes and Reports from third party applications in JSON format
- Allows 3rd party front-end or back-end applications to leverage MicroStrategy Data as a Service provider while leveraging MicroStrategy capabilities

What can you do with the APIs:
- Get metadata information for MicroStrategy Cubes or Reports
- Get data from MicroStrategy Cubes or Reports
- Apply filtering criteria
- Select columns to return (attributes and/or metrics)
- Leverage incremental data load for large datasets

- JSON Data APIs migrated to new REST server in 10.9
- Enhancements only available with new REST server
- Higher security with 10.9 will require some minor updates for session management for pre-10.9 REST API applications
- Stand-alone REST API Server is deprecated but still available until 10.10
API Example: Use Tableau to Connect to MicroStrategy

MicroStrategy’s comprehensive APIs allow organizations to access governed MicroStrategy data mashups via 3rd party applications

• MicroStrategy’s JSON Data API allows organizations to visualize trusted governed data via Tableau or any other application

• Maintain Secure Data Access by leveraging MicroStrategy’s security framework

• Business teams who rely on other BI tools now have access to the single version of truth, by harnessing MicroStrategy’s extensibility and metadata strength
### Tableau Datasets

<table>
<thead>
<tr>
<th>Name</th>
<th>Owner</th>
<th>Modified</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Income Analysis</td>
<td>Administrator</td>
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<td>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod...</td>
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<td>Customers Summary</td>
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<td>Employee Headcount by Country</td>
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</tr>
</tbody>
</table>
New Connector to Access data Across MicroStrategy projects
Allow analysts to access reports and cubes from one project and build dossiers in another

- **Access datasets between projects** via the new MicroStrategy Dataset connector, build with the new API

- Analysts can access **reports and cubes** from one project and build dossiers in another

- **Filter and preview** data with native and intuitive interfaces

Native connector to connect to data in other projects
Create

Browse
- Shared Reports
- My Reports
- History List
- My Subscriptions

Analyze
- Create Dossier
- Add External Data
- Upload MicroStrategy File

Develop
- Create Report
- Create Document
- Create Filter
- Create Prompt
- Create Metric
Embedding the MicroStrategy Metadata: Browsing REST API

MicroStrategy-powered applications

Browsing REST APIs
• Easy-to-use REST API to get content from/Navigate the MicroStrategy Metadata
• Allow third party front-end or back-end applications to leverage the MicroStrategy Metadata and associated security

What can you do with the APIs:
• Get MicroStrategy Metadata Folder content
• Search for specific MicroStrategy Objects
• Leverage Security/ACL information

```json
{
  "name": "Public Objects",
  "id": "string",
  "type": 0,
  "abbreviation": "Public Objects",
  "hidden": true,
  "subtype": 0,
  "dateCreated": "2017-05-22T16:25:47.377Z",
  "dateModified": "2017-05-22T16:25:47.377Z",
  "iconPath": "/icons/largeIcon.jpg",
  "owner": { ...
  "certifyStatus": { "certified": true, "dateCertified":
```
Session Management REST APIs

- Easy-to-use REST API to open a session with MicroStrategy platform using a REST API
- Project-level sessions are managed by the REST Server
- High security implementation (HTTP Header + Session Cookie)

What can you do with the APIs:

- Open a new session with the MicroStrategy Environment
- Close the session
- Get the current session privileges and user information
- Get an identity token to transfer the session to a different client

// Login using the guest authentication mode

curl -X POST --header 'Content-Type: application/json' --header 'Accept: application/json'  
-d '{    "username": "guest"    "loginMode": 8  }'  
'https://demo.microstrategy.com/MicroStrategyLibrary/api/auth/login'
Identity vs Authentication token
Different tokens, different use cases

Authentication token
• Obtained from /auth/login
• "X-MSTR-AUTH" HTTP Header for (almost) any REST API
• Lives as long as HTTP Session lives
• Random string
• Used in conjunction with HTTP Session identifier to authenticate user session
• Can not be transferred/re-used with another HTTP Session

Identity token
• Obtained from /auth/delegate
• "X-MSTR-IdentityToken" HTTP Header and can only be used to obtain an Authentication Token
• Very short life (configurable, expires after 5 mins by default)
• Encrypted string
• Not tied to any HTTP Session
• Can be transferred/re-used with another HTTP Session
Obtaining an Authentication token
Channel binding unbound

Getting Authentication token

// VERY VERY IMPORTANT to receive and send cookies
builder.addInterceptor(new okhttp3SendCookiesInterceptor(session));
builder.addInterceptor(new okhttp3ReceiveCookiesInterceptor(session));

RequestBody body = RequestBody.create(mediaType,
  "\n  "username": "mstr",
  "password": "xnDPsdQY36",
  "loginMode": 1\n".getBytes(StandardCharsets.UTF_8));
Request urlrequest = new Request.Builder()
  .url("https://myserver.microstrategy.com/MicroStrategyLibrary/api/auth/login")
  .addHeader("accept", "application/json")
  .addHeader("content-type", "application/json")
  .post(body)
Obtaining an Identity token
Channel binding unbound

Getting Identity token

// VERY VERY IMPORTANT to receive and send cookies
builder.addInterceptor(new okhttp3SendCookiesInterceptor(session));
builder.addInterceptor(new okhttp3ReceiveCookiesInterceptor(session));

Request urlrequest2 = new Request.Builder()
    .url("https://myserver.microstrategy.com/MicroStrategyLibrary/api/auth/identityToken")
    .addHeader("accept", "application/json")
    .addHeader("content-type", "application/json")
    .addHeader("X-MSTR-AuthToken", urlresponse.headers().get("X-MSTR-AuthToken"))
    .post(body)
Embedded MicroStrategy Content: Embedding SDK
MicroStrategy Content inside a 3rd Party Application

Embedding API
• Easy-to-use JavaScript API to embed Dossiers in third party applications
• Allow third party application codes to interact with MicroStrategy content and associated functionality
• Sample shows who to implement SSO or guest embedding

What can you do with the APIs:
• Navigation (list of chapters, navigate to a page)
• Filtering (get filter elements, apply filter)
• Manage Events ("page changed", "element selected")
• Session Management (SSO), pass authentication token

<div id="dossierPlaceholder"></div>
<script type="text/javascript">
var placeholderDiv = document.getElementById("dossierPlaceholder");
microstrategy.dossier.create({ placeholder: placeholderDiv, 
</script>
Easily Embed Dossiers into Portals, Websites, and Blogs

Embed dossiers in webpages, using single sign on for seamless access

- Embed Static and Interactive Dossiers into applications, portals and webpages
- Implement Single Sign-On so that users can seamlessly access the dossier, without getting prompted to log in
Demo: Embedding in Portals

As Erin boarded her plane from Austin to Washington, DC, she couldn’t help but wonder...

In this day and age, AirBnB helps you find the best accommodation that suits your needs. In...

For all of us at AirBnb, helping people anywhere isn’t only about vacationers. We un...
User Management REST API

MicroStrategy User Management inside a 3rd party application

User Management REST APIs

• Easy-to-use REST APIs to manage MicroStrategy Users / User Groups and automated on-boarding
• Allow third party front-end or back-end applications to manage MicroStrategy Security

What can you do with the APIs:

• Create, update, delete users and user groups
• Manage user group membership
• Manage MicroStrategy Security Roles
• Automate user management and onboarding process

curl -X GET
   --header 'Accept: application/json'
   --header 'X-MSTR-AuthToken: rvbmgf9jsh1j09jlc3mo9jqeh0'
Governance managed by 3rd party application: Certification REST API
Managing MicroStrategy Metadata Object Certification

Certification REST APIs
• Easy-to-use REST APIs to manage MicroStrategy Metadata Object certification
• Allow third party front-end or back-end applications to implement approval workflows and manage certification of MicroStrategy Objects stored in the MicroStrategy Metadata

What can you do with the APIs:
• Certify Data Sources, Dashboards, Documents, Dossiers
• Remove certification

curl -X PUT --header 'Content-Type: application/json' --header 'Accept: application/json'
--header 'X-MSTR-AuthToken: XToken' --header 'X-MSTR-ProjectID: ProjectID'
'http://dexters.labs.microstrategy.com:8080/consume-dev/api/objects/ObjectGUID/certify?type=ObjectTypeDoc&certify=true'
Environment Management: MicroStrategy on AWS REST API
Managing MicroStrategy Environments running in AWS

**MicroStrategy on AWS REST APIs**
- Easy-to-use REST APIs to manage MicroStrategy Environments running in AWS
- Allow third party front-end or back-end applications to deploy and manage MicroStrategy Environments in AWS instances

**What can you do with the APIs:**
- Create a new MicroStrategy environment
- Stop/Start MicroStrategy deployment
- Stop/Start single nodes in a MicroStrategy deployment
- Resize an environment

```bash
curl -X POST --header 'Content-Type: application/json' --header 'Accept: application/json' --header 'x-api-key: ASDASDA893248ff89ssvadga0ugd' -d '{[761253]}' 'https://developer.customer.cloud.microstrategy.com/api/environments/start'
```
Environment Management: Elastic resize of MicroStrategy Environment

MicroStrategy on AWS automatic resizing

Use case: starting/stopping Intelligence Server nodes automatically

• If CPU utilization has been over 75% for the past 3H, start a node
• If CPU utilization has been less than 30% for the past 3H, stop a node
MicroStrategy Data inside a 3rd party application: Push Data API

3rd party-powered MicroStrategy analytics applications

**Push Data API**

- Easy-to-use REST API to push data directly to the MicroStrategy Intelligence Server into a cube data structure

- Allow third party front-end or back-end applications to leverage transactional write back to MicroStrategy

**What can you do with the APIs:**

- Push data into new MicroStrategy data import cubes

- Append or update data in existing dataset data (row level)

- Leverage JSON Data API in subsequent requests to get dataset data in JSON format

```json
{
    "datasetId": "21F855B44A5B75E4E16089BD1A092B9E",
    "name": "Demo",
    "tables": [{
        "id": "E281851C158933CA4983912447173529",
        "name": "SALES_TABLE"
    }]
}
```
API Example: Cloud and Push API

Near real-time streaming of data into a dashboard

• **Start and stop a MicroStrategy Cloud instance** via the MicroStrategy on AWS REST API

• Cube is created based on data streaming from IoT data feed. Analysts can access **reports and cubes** as data is streamed in.

---

Data is streamed into a cube as it becomes available.
<table>
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<tr>
<th>Environment</th>
<th>Owner</th>
<th>Created On (EST)</th>
<th>Expires On (EST)</th>
<th>AWS Cost Estimate</th>
<th>State</th>
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<tr>
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<td>Henri-Francois Chadeisson</td>
<td>Apr 5, 2017 11:49 AM</td>
<td>Jun 30, 2017 10:00 AM</td>
<td>$24/day</td>
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<td>10.6 SE Super Demo</td>
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<td>$29/day</td>
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Three Key Target Scenarios to Support Embedded Analytics

Embed MicroStrategy content into custom applications and workflows
• Embed MicroStrategy content into a web page or application
• Embed data from MicroStrategy into an application
• Leverage MicroStrategy capabilities (SSO, Folders, …) in an application
• White label MicroStrategy functionalities

Integrate MicroStrategy platform into a custom product offering
• Automated deployment and upgrade of a MicroStrategy environment
• Programmatic user and security management
• Updating MicroStrategy cube data from 3rd party applications/workflows
• Programmatic object management

Extend MicroStrategy capabilities with 3rd party functionality (and vice versa)
• Connect new sources to MicroStrategy
• Add new visualizations to MicroStrategy
• Add new workflows to MicroStrategy
• Push new data and metadata to MicroStrategy
• Pull data from MicroStrategy and process in other systems (e.g. Machine Learning)
**MicroStrategy 10 is Built as an Open Architecture**

A comprehensive set of APIs allows you to integrate, embed, and extend the functionality of your existing investments

<table>
<thead>
<tr>
<th>CUSTOM WEB APPLICATION</th>
<th>BUILD CUSTOM CONNECTORS</th>
<th>PORTAL INTEGRATION</th>
<th>WHITE LABELING</th>
</tr>
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<tbody>
<tr>
<td>CUSTOM WEB APPLICATION</td>
<td>3RD PARTY DATA AS MICROSTRATEGY DATASET</td>
<td>PORTAL INTEGRATION</td>
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<td>BUILD CUSTOM CONNECTORS</td>
<td>PORTAL INTEGRATION</td>
</tr>
</tbody>
</table>

- **3rd Party Data as MicroStrategy Dataset**: 3rd party application
- **Custom Connectors**: Build custom connectors
- **Portal Integration**: White labeling
- **Web Services**: Custom widget in MicroStrategy app
- **D3 | Google Charts**: Embed visualizations in your web apps
- **MicroStrategy Widget in Custom App**: Embed visualizations in your web apps
- **Cloud Deployment**: White labeling

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### APIs

- **REST API**
- **Push API**
- **Data Connector SDK**
- **Web SDK**
- **Mobile SDK**
- **Visualization SDK**
- **Embedding API**
- **Cloud API**

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MicroStrategy Community for documentation, samples, etc.: [https://developer.microstrategy.com/](https://developer.microstrategy.com/)
Summary
During this session we spent time understanding:

• What the market means by “Embedded Analytics” and how REST APIs help
• The use cases for MicroStrategy REST APIs support deploying Embedded Analytics applications
• Some of the most recent SDKs and API capabilities of the MicroStrategy 10 Analytical platform

MicroStrategy Community for documentation, samples, etc.: https://developer.microstrategy.com/
Next Steps

• Visit the http://www.microstrategy.com/ web site and browse the embedded analytics section
• Try out the samples posted on the community
• Attend the workshop with the Embedding and REST APIs

MicroStrategy API Community, Documentation for REST API and every other API-related topic: https://developer.microstrategy.com/