knowledge16

Experience the Service Revolution



Inbound Web Service APIs – Integration 202

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servicenow

Who Are We?

- Dave Slusher
  - Almost 2.5 years working for ServiceNow
  - Nearly 20 years of a full stack developer
  - Integrations fanatic
  - Lives near Myrtle Beach, South Carolina
- Martin Wood
  - Over 8 years working with ServiceNow
  - Almost 8 years working for ServiceNow
  - Loves the power of the platform
  - Lives in Reading, UK





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Introduction

- This session will help you:
  - Understand what REST Web Services are
  - Use the REST Explorer to investigate the capabilities of your instance
  - See how data can be extracted into CSV, XML and other formats
  - Use Import Sets to insert great quality data
  - Review the SOAP API

- And provide an opportunity to ask questions!

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Overview of Lab

1. The basics of REST
2. Use the REST Explorer to view, test and connect
3. Creating ad-hoc queries
4. Attaching and counting
5. The Import Set API
6. Other sorts of data
7. Walkthrough SOAP

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Time for some REST

"Yesterday is gone. Tomorrow has not yet come. We have only today. Let us begin."

Mother Teresa

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What is REST?

- Representational State Transfer
  - Transfers a representation (data and metadata), and the intended state of that representation
  - It's a structured way of moving data!
- A web service architecture style
  - It is not a standard, but builds on standards and conventions
  - Client-server; stateless; cachable; layered; uniform interface
- The web is (mostly) RESTful
- Simpler and more flexible than SOAP!
  - Don't need a WSDL, since its self describing!

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HTTP Communication Flow

GET www.dasos.com/ash.jpg
Accept: */*
Authorization: Baasic
YWRtaW46YWRtaW4=
....

1. Client sends HTTP request

2. Server processes the request

3. Server sends back response

HTTP/1.1 200 OK
Cache-Control: max-age=43200, public
Connection: keep-alive
Content-Length: 26717
Content-Type: image/png
....



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No Contract Needed!

- Collections are lists or groups
  - Act on many things at once

    example.com/api/users/

- GET: Return list of users
- POST: Creates a user record
- PUT: Modifies a filtered list of records
- DELETE: Deletes qualifying records

- Elements are individual items
  - Work with a single item

    example.com/api/users/martin.wood

- GET: Returns the given user record
- POST: N/A
- PUT: Modifies single record
- DELETE: Deletes single record

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Major Components of a REST Request

- HTTP method
- Uniform Resource Identifier (URI)
- Parameters
- Headers
- Body/content

- POST http://demo.service-now.com/api/now/table/sys_user?sysparm_fields=name
- Accept: application/json
  Authorization: Basic YWRtaW46YWRtaW4=
- {
  'first_name' : 'Martin',
  'last_name' : 'Wood'
  }

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Major Components of a REST Response

- HTTP status
- Headers
- Body/content

- 201 OK

- X-Total-Count: 565
- Pragma: no-store,no-cache
- Content-Type: application/json;charset=UTF-8

-
```
{
   "result": {
         "name": "Martin Wood"
   }
}
```


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Common HTTP Response Codes

Successful!

- 200
  - Success, with body – good for GET
- 201
  - Created – positive for POST
- 204
  - Success, no body – delightful for DELETE

Not so good

- 401
  - Unauthorized – have you supplied a username and password?
- 403
  - Forbidden – do you have the right roles?
- 404
  - Not found – if you try to GET a resource that doesn't exist
- 500
  - Server based error – something has gone wrong on the instance

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ServiceNow Follows the Standard Conventions

<instance>.service-now.com/api/now/v2/table/sys_user

Versioning (optional)

- v2 is the latest version of the Table API
  - v1 returns the error code 404 on a valid GET query that contains no results.
  - v2 returns the success status code 200 and an empty array as the response body instead.

Headers

- Specify XML or JSON

Table API

- GET
  - /api/now/table/{table_name}
    gets filtered list of records
  - /api/now/table/{table_name}/{sys_id}
    single record
- PUT
  - /api/now/table/{table_name}/{sys_id}
    updates specific record
- POST
  - /api/now/table/{table_name}
    creates record in the table
- DELETE
  - /api/now/table/{table_name}/{sys_id}
    deletes specific record

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The REST Explorer

Lab 1

- Use the instance to explore the REST web services available
  - No outside tools needed
- Create queries, set options, generate code
  - Even helps you paginate!
- Take the options you set, and use in other tools

- Fancy testing your knowledge? Try out these quiz questions!
  - http://snquiz.com/0101
  - http://snquiz.com/0102
  - http://snquiz.com/0103

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Filter and Control the Results

/api/now/table/sys_user?sysparm_limit=10&sysparm_query=active=true&...

Parameters

- Most commonly used
  - sysparm_query
    - Get the results you want by giving an encoded query
  - sysparm_display_value
    - Do you want the database values, human readable labels, or both?
  - sysparm_fields, sysparm_view
    - Choose what data gets returned by specifying the fields or a view
  - sysparm_limit, sysparm_offset
    - How many records should be returned, and what point to start from

Queries

- Create complex encoded queries in the UI, or create your own
  - field=value - returns only exact matches
    - active=true
  - ^ and ^OR – provide two conditions
    - name=Fred^Oname=Don
  - ^ORDERBYfield – sort by a field
    - ^ORDERBYlast_name

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Build Your Own REST Query

Lab 2

- Use other tools to interact with the REST API
  - Use Hurl or another tool
- Understand the URL syntax
- Set your own query, and manipulate the parameters

- Fancy testing your knowledge? Try out these quiz questions!
  - http://snquiz.com/0201
  - http://snquiz.com/0202
  - http://snquiz.com/0203
  - http://snquiz.com/0204

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Using Other APIs

/api/now/attachment /api/now/stats/sys_user?sysparm_count=true

Attachment API (files)

- GET
  - /api/now/attachment
    gets metadata for many attachments
  - /api/now/attachment/{sys_id}
    gets metadata for a single attachment
  - /api/now/attachment/{sys_id}/file
    gets binary data for a single attachment
- POST
  - /api/now/attachment/file
    uploads a file that is in the body of the message
  - /api/now/attachment/upload
    uploads a file that is part of a form
- DELETE
  - /api/now/attachment/{sys_id}
    deletes specific attachment

Aggregate API (stats)

- Get counts, averages, sum, min and max
  - sysparm_<aggregate>_fields=
    - Specify avg, min, max or sum
    - sysparm_avg_fields=duration
  - sysparm_group_by
    - Do you want groups of fields?
  - sysparm_count
    - Set to true to return counts
  - sysparm_query, sysparm_having
    - Filter pre, or post

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Attaching and Counting

Lab 3

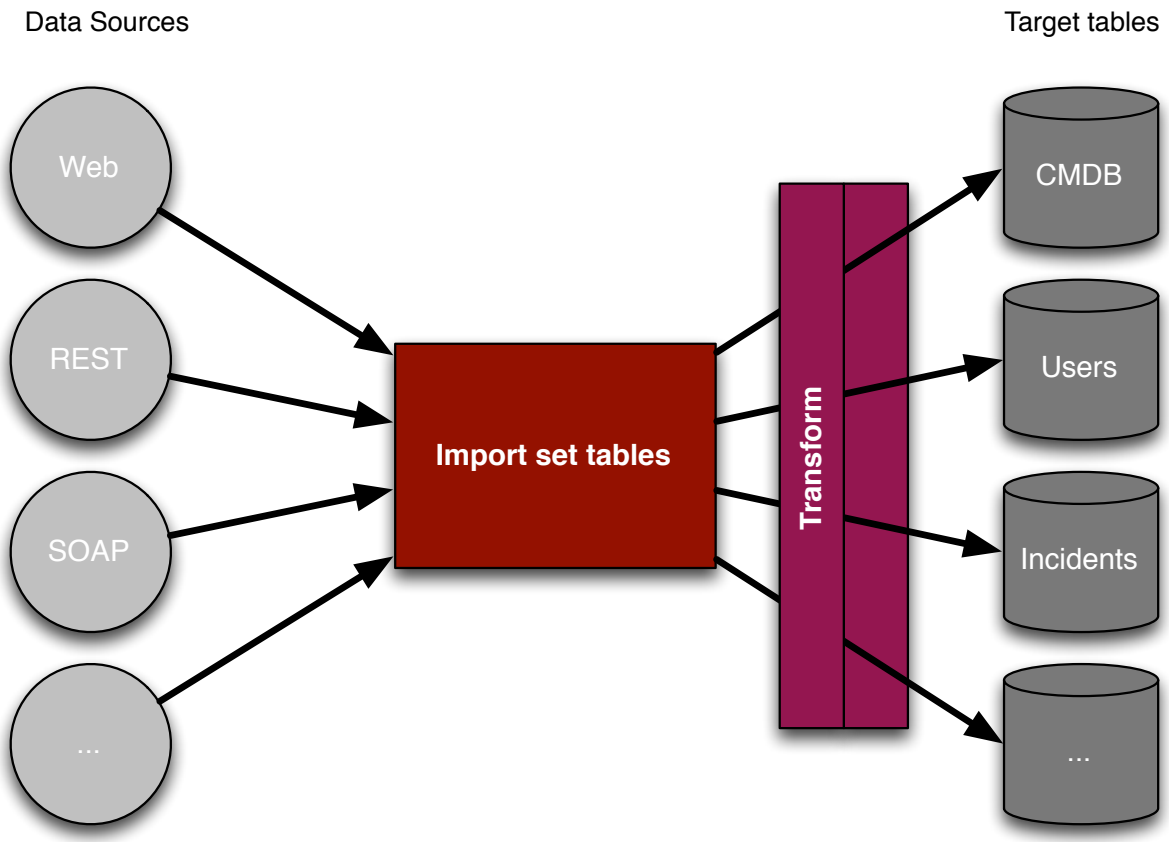
- Start exploring the other APIs available
  - Other APIs for the CMDB and Performance Analytics
- Uploading files is now much easier
  - No messing with base64 encoding!
- Run simple record queries

- Fancy testing your knowledge? Try out these quiz questions!
  - http://snquiz.com/0301
  - http://snquiz.com/0302
  - http://snquiz.com/0303

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Import Web Services

- Import Sets give more control
  - Give scripting and mapping around incoming data
  - Can validate choice fields and reference fields
  - Can view raw data that came in
  - Can decide whether or not to accept the data
  - Can blank out fields
  - Get better logging
  - Automatically determines to create or update
    - Always set a coalesce field
  - Import Sets let you import data from any schema
- Always prefer Import Sets to importing directly into a table



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Attaching and Counting

Lab 4

- Use the Import Set API
- Alter a Transform Map
- Set default values
- Easily create any record

- Fancy testing your knowledge? Try out these quiz questions!
  - http://snquiz.com/0401
  - http://snquiz.com/0402
  - http://snquiz.com/0403

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Getting Other Formats

<instance>.service-now.com/sys_user_list.do?CSV

Common parameters

- sysparm_query and sysparm_view

CSV

- Download large amounts of data
- Supports POST to upload new data

XML

- Download semi-large amounts of data
- Can be a perfect database representation
  - Use useUnloadFormat
- Can also get meta-data with SCHEMA and XSD parameter

PDF

- Get a single record (without _list)
- Get list of records

RSS

- Get a very simple feed
- Use sysparm_format to get formatted results

JSON and JSONv2

- The old way to get JSON
- The REST APIs are the future!

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Exporting in Other Formats

Lab 5

- Download lists as CSV or PDF
- Filter using standard parameters
- Specify the fields to get the data you want

- Fancy testing your knowledge? Try out these quiz questions!
  - http://snquiz.com/0501
  - http://snquiz.com/0502
  - http://snquiz.com/0503

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Postman and OAuth

Lab 6

- Use Postman, which is more powerful than Hurl
- Use it to get an OAuth token
- Use the OAuth token instead of your username and password

- Basic Authentication
- Send the username and password in every requests
- Protected by HTTPS
- OAuth
- Send your username and password, get a time limited token
- Submit your token instead of your username and password

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Let’s Talk About SOAP

“You have to know the past to understand the future.”

Carl Sagan

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What is SOAP?

- Used to be an acronym for Simple Object Access Protocol
- Designed to exchange structured information over networks
- Platform & language independent
  - Almost always uses the web, but in theory you could you use SOAP over email
- XML based protocol

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SOAP describes itself through the WSDL

- WSDL –
  Web Service Description Language
  - Catalog of available operations/actions
  - Gives a templates for the requests
  - Explains what the response will be

```
+ <xsd:element name="getKeysResponse"></xsd:element>
+ <xsd:element name="get"></xsd:element>
+ <xsd:element name="getResponse"></xsd:element>
- <xsd:element name="getRecords">
  - <xsd:complexType>
    + <xsd:sequence></xsd:sequence>
    </xsd:complexType>
  </xsd:element>
- <xsd:element name="getRecordsResponse">
  - <xsd:complexType>
    - <xsd:sequence>
      - <xsd:element maxOccurs="unbounded" minOccurs="0" name="getRecordsResult">
        - <xsd:complexType>
          - <xsd:sequence>
              <xsd:element maxOccurs="1" minOccurs="0" name="accumulated_roles" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="active" type="xsd:boolean"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="building" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="calendar_integration" type="xsd:integer"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="city" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="company" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="cost_center" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="country" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="date_format" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="default_perspective" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="department" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="edu_status" type="xsd:string"/>
              <xsd:element maxOccurs="1" minOccurs="0" name="email" type="xsd:string"/>
```


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SOAP Envelope

- Envelope
  - Packages the message
  - XML namespaces specify that it's SOAP
- Header (optional)
  - Contains processing instructions for the envelope
- Body
  - Contains the actual message to be delivered
- Fault element (optional)
  - Provides error information

```
– <soap:Envelope soap:encodingStyle="http://www.w3.org/2003/05/soap-encoding">
    <soap:Header> ... </soap:Header>
  – <soap:Body>
      ...
      <soap:Fault> ... </soap:Fault>
    </soap:Body>
  </soap:Envelope>
```


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SOAP Communication Flow

```
<soapenv:Envelope>
   <soapenv:Header/>
   <soapenv:Body>
      <sys:getRecords>
         <user_name>admin</user_name>
      </sys:getRecords>
   </soapenv:Body>
</soapenv:Envelope>
```

1. Client sends SOAP Request

Client consumes WSDL to understand schema (once)

2. Server processes the SOAP Request

3. Server sends a SOAP Response

```
<SOAP-ENV:Envelope>
   <SOAP-ENV:Body>
      <getRecordsResponse>
         <getRecordsResult>
            <last_login_time>2016-05-05 11:27:34</last_login_time>
            <name>System Administrator</name>
            <notification>2</notification>
            <password_needs_reset>0</password_needs_reset>
            <phone/>
            <photo/>
            <preferred_language/>
            <roles>admin</roles>
```


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SOAP Web Service APIs

- Direct Table Web Service API
  - /incident.do?WSDL
  - /my_custom_table.do?WSDL
- Operations
  - Create, Read, Update, Delete
- Interact directly with the table
  - Business rules run as normal, etc.

- Web Service Import Set API
  - /import_set_table.do?WSDL
- Operations
  - Create (insert)
  - Other CRUD functions available but not typically applicable
- Once inserted, runs the Transform Map

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CRUD Operations

- insert – Creates a new record
  - Send the contents of the new record (almost any field you want)
  - Receive the sys_id and the display name of the record
- get – Returns a single record
  - Send the sys_id of the record
  - Receive every field of the record
- getKeys – Search for matching records
  - Send the fields you want to search for
  - Receive a series of sys_ids
- getRecords – Search and get many records
  - Send the fields you want to search for
  - Receive every field of the matching records
- update – Modify an existing record
  - Send the sys_id of the record, plus the fields you want to update
  - Receive the sys_id of the record that was updated
- deleteRecord – Delete a single record
  - Send the sys_id of the record you want to delete
  - Receive the sys_id of the deleted record
- delete – Search and delete many records
  - Send the fields you want to search for
  - Receive the sys_id of the deleted records

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Demo!

SOAP Web Service API

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Top Takeaways

1. REST is the future!
2. Use Import Sets to insert new records.
3. Use the REST Explorer to test and learn all the options.

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Take the Survey

Please take a moment to complete a session survey in the Knowledge16 app.

Thank You

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