

Learning Client Hypermedia from the Ground Up

Mike Amundsen
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Day One - From Zero to Links

- What is Hypermedia and Why Use It?
- The Plain JSON Client
- BREAK
- Plain JSON and Change
- The JSON Link Client
- BREAK
- The Link Client and Change
- Daily Wrap-Up and Look Ahead

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Day Two - From Templates to Profiles

- The JSON Template Client
- The JSON Template Client and Change
- BREAK
- The JSON Profile Client
- The JSON Profile Client and Change
- BREAK
- Course Summary

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Resources

- The Slack Channel is open (and will stay open)
 - <https://oreillyonlinetraining.slack.com/messages/G66CQBHCL/>
 - Feel free to post Qs throughout the course
 - Continue the convos w/ fellow students after the course is completed
- The online repo will host all the materials
 - <https://github.com/apiacademy/2017-07-safari-hypermedia-workshop>
 - Slides
 - Code
 - Notes
- This repo will stay "alive" after the course is over
 - Feel free to use the Issues section to discuss details
 - Submit PRs to improve the content



General Remarks

- We'll have a short Q&A review after each section
- Feel free to post questions throughout the day.
- Be sure to mute any microphones unless you are speaking
- We'll have breaks every hour
- If needed, you can step away from the terminal any time

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Let's get started!

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Day Two: From Templates to Profiles

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The JSON Template Client

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Lecture:

Describing Actions



Created by Iconfactory Team
from Noun Project

Describing ACTIONS

- ACTIONS: more than navigation (LO), transclusion (LE)
- Another word for ACTIONS is Templates (LT, LI, LN)
- In HTML, a Template is a FORM
- Template Clients understand ACTION descriptions

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Describing ACTIONS

- What is needed for describing ACTIONS for HTTP?
 - URL
 - Method (CM)
 - Format (CR)
- Also INPUT properties
 - Name/Id (givenName)
 - Prompt ("First Name")
 - Constraints (required, input pattern, etc.)

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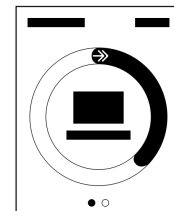
Describing ACTIONS

```
{  
  "template" : {  
    "method" : "POST", "id" : "create",  
    "href" : "http://api.example.org/todo/",  
    "args" : [  
      {"name" : "title", "prompt" : "Title", "value" :  
""},  
      {"name" : "tags", "prompt" : "Tags", "value" : ""}  
    ]  
  }  
}
```

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Exercise: Including Templates



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from Noun Project

Live Screen Session...

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Sidebar:

The Siren Media Type



Created by Blake Stevenson
from Noun Project

Siren Media Type

Structured Interface for Representing Entities (Siren)

Kevin Swiber, 2012

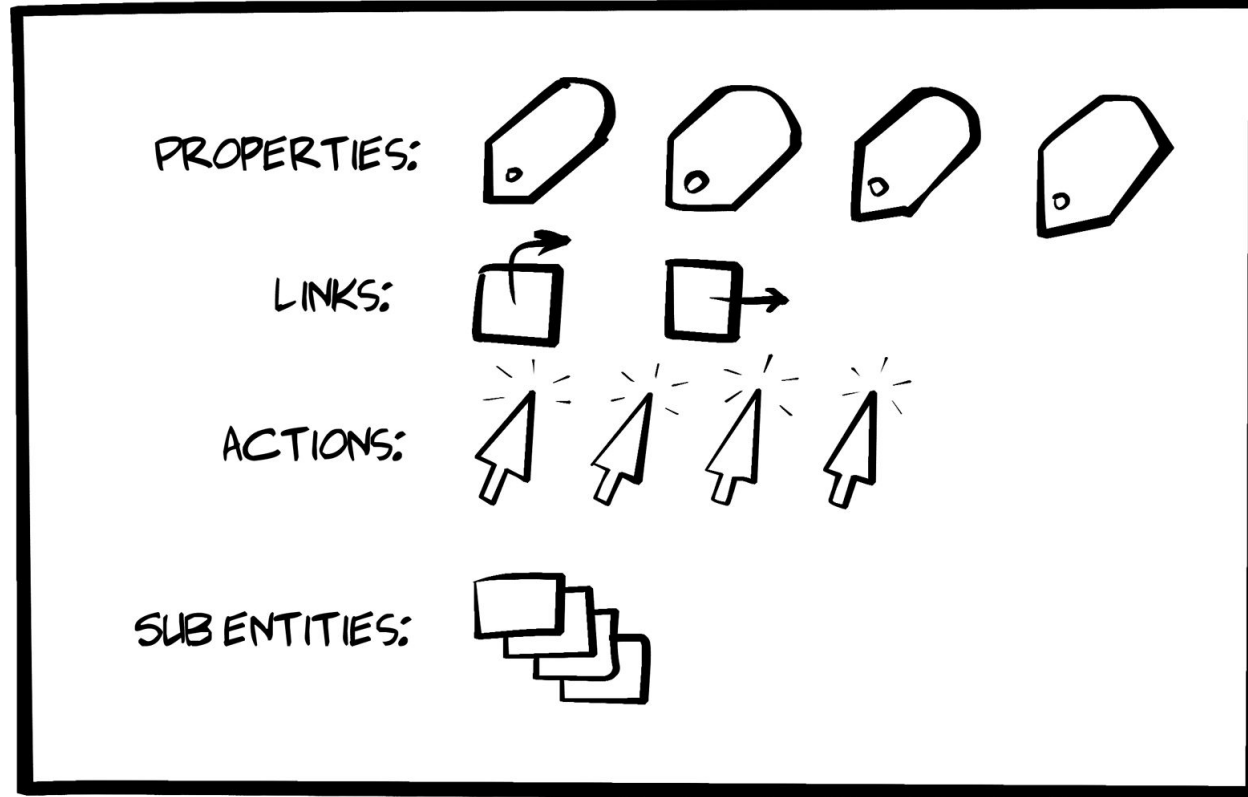
"The biggest differentiator of Siren is Actions. ... Siren also has a concept of 'class.' The class attribute may contain multiple descriptors of the current representation. I've avoided calling these 'type descriptors.' They act more like 'mixin descriptors.'"

<https://github.com/kevinswiber/siren>

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Siren Media Type



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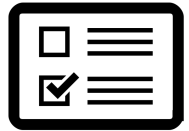


```
{
  "class": ["order"],
  "properties": {
    "orderNumber": 42,
    "itemCount": 3,
    "status": "pending"
  },
  "entities": [
    {
      "class": ["items", "collection"],
      "rel": ["http://x.io/rels/order-items"],
      "href": "http://api.x.io/orders/42/items"
    },
    {
      "class": ["info", "customer"],
      "rel": ["http://x.io/rels/customer"],
      "properties": {
        "customerId": "pj123",
        "name": "Peter Joseph"
      },
      "links": [
        { "rel": ["self"], "href": "http://api.x.io/customers/pj123"}
      ]
    }
  ],
}
```

```
    "links": [
      { "rel": ["self"], "href": "http://api.x.io/customers/pj123"}
    ]
  },
  "actions": [
    {
      "name": "add-item",
      "title": "Add Item",
      "method": "POST",
      "href": "http://api.x.io/orders/42/items",
      "type": "application/x-www-form-urlencoded",
      "fields": [
        { "name": "orderNumber", "type": "hidden", "value": "42"},
        { "name": "productCode", "type": "text"},
        { "name": "quantity", "type": "number"}
      ]
    }
  ],
  "links": [
    { "rel": ["self" ], "href": "http://api.x.io/orders/42"},
    { "rel": ["previous" ], "href": "http://api.x.io/orders/41"},
    { "rel": ["next" ], "href": "http://api.x.io/orders/43"}
  ]
}
```

Quiz:

Is this a Template?



Is this a template?

- `http://api.example.org/filter`

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Is this a template?

- `http://api.example.org/filter`
- `http://api.example.org/filter?search={text}`

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Is this a template?

- `http://api.example.org/filter`
- `http://api.example.org/filter?search={text}`
- ```
{
 href:"...", method="patch",
 format="application/json-patch",
 args: [
 {"name":"email","prompt":"Email","value":""},
 {"name":"phone-sms","prompt":"SMS","value":"",""}
]
}
```

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# The JSON Template Client And Change

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# Lecture:

# Adding the Tag Field



# Adding Tag Field Support

- The **tag** field SHOULD appear for every ToDo record
- It is an OPTIONAL field
- It contains a comma-delimited list of values
- It can be updated when adding new ToDo records
- It can be updated when editing existing ToDo records
- A FilterByTag operation SHOULD be supported

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# Adding Tag Field Support

- Views Affected
  - List
  - Item
  - Add
  - Update
- Also, a new Filter ACTION

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# Adding Tag Field Support

- What are the OAA Challenges here?
  - Object (*new field to display*)
  - Address (*none*)
  - Actions
    - Modified Add
    - Modified Update
    - New Filter

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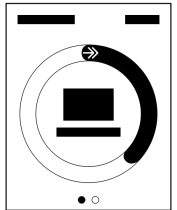


*Can you predict the results?*

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# Exercise: Including Tag Field Support



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from Noun Project

# Live Screen Session...

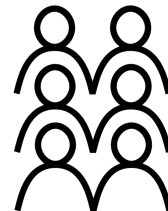
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# Group Discussion:

## Why is Siren Media Type Different?

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from Noun Project



# Live Screen Session...



# BREAK

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from Noun Project

# The JSON Profile Client

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# Lecture:

# Describing Object Profiles



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# Describing Objects

- Properties of a field:
  - Name
  - Prompt
  - Render Flag
  - Display Mask
  - Order of Appearance

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# Profiles for Object Description (POD)

## Profile for Object Description (POD)

Mike Amundsen 2016

*"This specification is designed to describe the rules for displaying domain objects and their properties in a human-centric user interface."*

<http://rwcbook.github.io/pod-spec/>

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# Profiles for Object Description (POD)

## A Valid POD Document

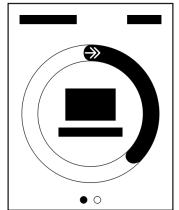
```
{
 "user" : {
 "id" : {"prompt" : "ID", "render" : "none"},
 "nick" : {"prompt" : "Nickname", "render" : "text"},
 "email" : {"prompt" : "Email", "render" : "text"},
 "name" : {"prompt" : "Full Name", "render" : "text"},
 "password" : {"prompt" : "Password", "render" : "text"},
 "dateCreated" : {"prompt" : "Date Created", "render" : "none"},
 "dateUpdated" : {"prompt" : "Date Updated", "render" : "none"}
 }
}
```

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# Exercise:

# Adding POD Support



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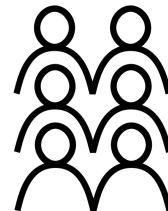


# Live Screen Session...



# Group Discussion: Can We Improve the POD Spec?

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# Live Screen Session...

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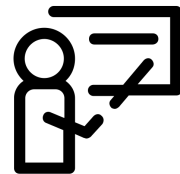
# JSON Profile Client And Change

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# Lecture:

# Supporting ToDo Descriptions



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# Adding Description Field Support

- The **description** field SHOULD appear for every record
- It is an OPTIONAL field
- It can be updated when adding new ToDo records
- It can be updated when editing existing ToDo records
- A FilterByDescription operation SHOULD be supported

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# Adding Tag Field Support

- Views Affected
  - List
  - Item
  - Add
  - Update
- Also, a new Filter ACTION

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# Adding Tag Field Support

- What are the OAA Challenges here?
  - Object (*new field to display*)
  - Address (*none*)
  - Actions
    - Modified Add
    - Modified Update
    - New Filter

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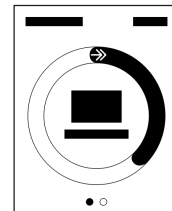


*Can you predict the results?*

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# Exercise: Including Description Support

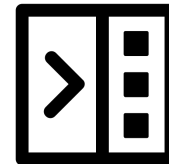


Created by Joel Wisneski  
from Noun Project

# Live Screen Session...



# Sidebar: The Collection+JSON Media Type



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# Collection+JSON Media Type (Cj)

Mike Amundsen, 2011

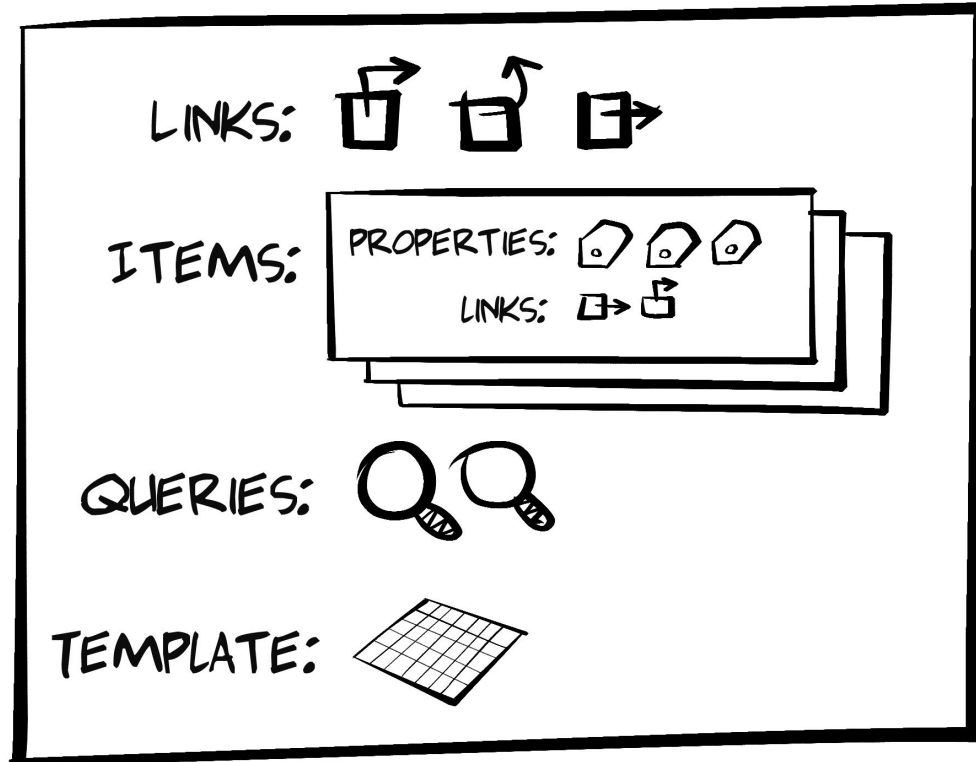
*"[Cj] is similar to the Atom Syndication Format (RFC4287) and the Atom Publishing Protocol (RFC5023). However, Collection+JSON defines both the format and the protocol semantics in a single media type. [Cj] also includes support for Query Templates and expanded write support through the use of a Write Template."*

<http://amundsen.com/media-types/collection>

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# Collection+JSON Media Type (Cj)



```
{
 "collection": {
 "version": "1.0",
 "href": "http://rwcbook12.herokuapp.com",
 "title": "TPS - Task Processing System",
 "links": [
 {
 "href": "http://rwcbook12.herokuapp.com/",
 "rel": "collection",
 "prompt": "All task"
 }
],
 "items": [
 {
 "rel": "item",
 "href": "http://rwcbook12.herokuapp.com/1sv697h2yij",
 "data": [
 {"name": "id", "value": "1sv697h2yij", "prompt": "id"},
 {"name": "title", "value": "Marina", "prompt": "title"},
 {"name": "completed", "value": "false", "prompt": "completed"}
]
 },
 {
 "rel": "item",
 "href": "http://rwcbook12.herokuapp.com/25ogsjhqtk7",
 "data": [
 {"name": "id", "value": "25ogsjhqtk7", "prompt": "id"},
 {"name": "title", "value": "new stuff", "prompt": "title"},
 {"name": "completed", "value": "true", "prompt": "completed"}
]
 }
]
 },
}
```

```

],
 {
 "rel": "item",
 "href": "http://rwcbook12.herokuapp.com/25ogsjhtk7",
 "data": [
 { "name": "id", "value": "25ogsjhtk7", "prompt": "id" },
 { "name": "title", "value": "new stuff", "prompt": "title" },
 { "name": "completed", "value": "true", "prompt": "completed" }
]
 }
],
 "queries": [
 {
 "rel": "search",
 "href": "http://rwcbook12.herokuapp.com/",
 "prompt": "Search tasks",
 "data": [
 { "name": "title", "value": "", "prompt": "Title" }
]
 }
],
 "template": {
 "prompt": "Add task",
 "rel": "create-form",
 "data": [
 { "name": "title", "value": "", "prompt": "Title" },
 { "name": "completed", "value": "false", "prompt": "Complete" }
]
 }
}

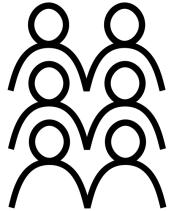
```



# Group Discussion:

## Why use Collection+JSON Media Type?

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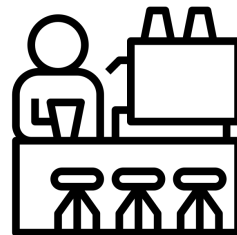
# Live Screen Session...

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# BREAK

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# Course Summary

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# H-Factors



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from Noun Project

# H-Factors

*"The H Factor of a media-type is a measurement of the level of hypermedia support and sophistication of a media-type."*

*"H Factor values can be used to compare and contrast media types in order to aid in selecting the proper media-type(s) for your implementation."*

*- Mike Amundsen (2010)*

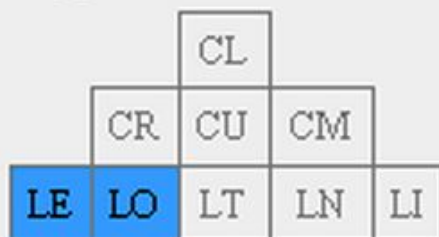


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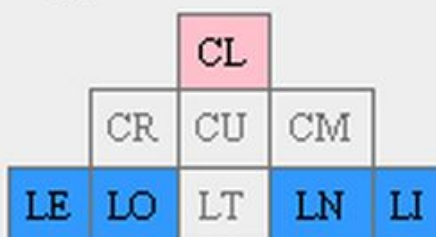
# H-Factors

## Hypermedia Factors



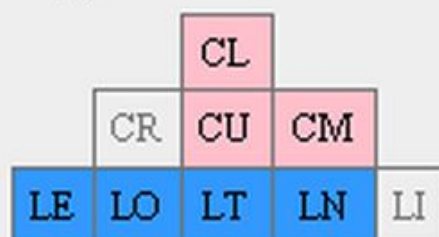
SVG

## Hypermedia Factors



Atom

## Hypermedia Factors



HTML

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# The OAA Challenge



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# The OAA Challenge

- All client apps need to deal with three key elements
  - Objects (Oxx)
  - Addresses (xAx)
  - Actions (xxA)
- Typically this is handled in client **code**.
- When any details of the OAA change, the client code **MUST** change, too.

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# The OAA Challenge

- Adding a field is a change to the Object ("O" in "OAA")
- Changing the URLs is a change to the Addresses
- Adding new filter or write operations is a change to the Actions

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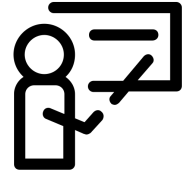
# The OAA Challenge

- Adding a field is a change to the Object ("O" in "OAA")
- Changing the URLs is a change to the Addresses
- Adding new filter or write operations is a change to the Actions

*How do we solve the OAA Challenge?*



# The Meta-Story



Created by Iconfactory Team  
from Noun Project

# The Meta-Story

- It's the meta-data, silly!
- OBJECT meta-data
- ADDRESS meta-data
- ACTION meta-data

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# The Meta-Story

- It's the meta-data, silly!
- OBJECT meta-data
- ADDRESS meta-data
- ACTION meta-data

***You solve the OAA Challenge with meta-data.***

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# Quiz:

## Pin the Client on the Media Type



# Pin the Client on the Media Type

- I need a client that does mostly search/filter actions. Which media type should I use?

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# Pin the Client on the Media Type

- I need a client that does mostly search/filter actions.  
Which media type should I use?
- I need a client that supports HTTP PUT actions.  
Which media type should I use?

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# Pin the Client on the Media Type

- I need a client that does mostly search/filter actions.  
Which media type should I use?
- I need a client that supports HTTP PUT actions.  
Which media type should I use?
- I need a client that supports HTTP PATCH actions.  
Which media type should I use?



# Review

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# Day One Review : From Zero to Links

- Hypermedia Basics
- Classic CRUD Pattern
- The OAA Challenge
- The HAL Media Type

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# Day Two Review : From Templates to Profiles

- Describing Actions
- The Siren Media Type
- Display Profiles
- The Collection+JSON Media Type

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# Learning Hypermedia from the Ground Up

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