Web 2.0

Lecture 5: Data Structures – Atom and AtomPub

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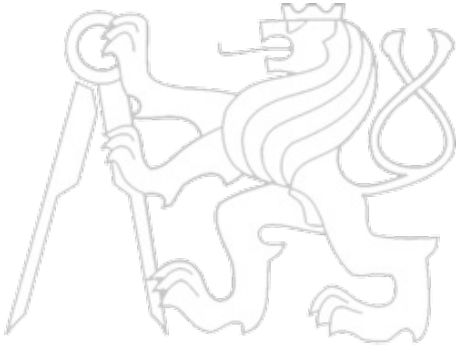

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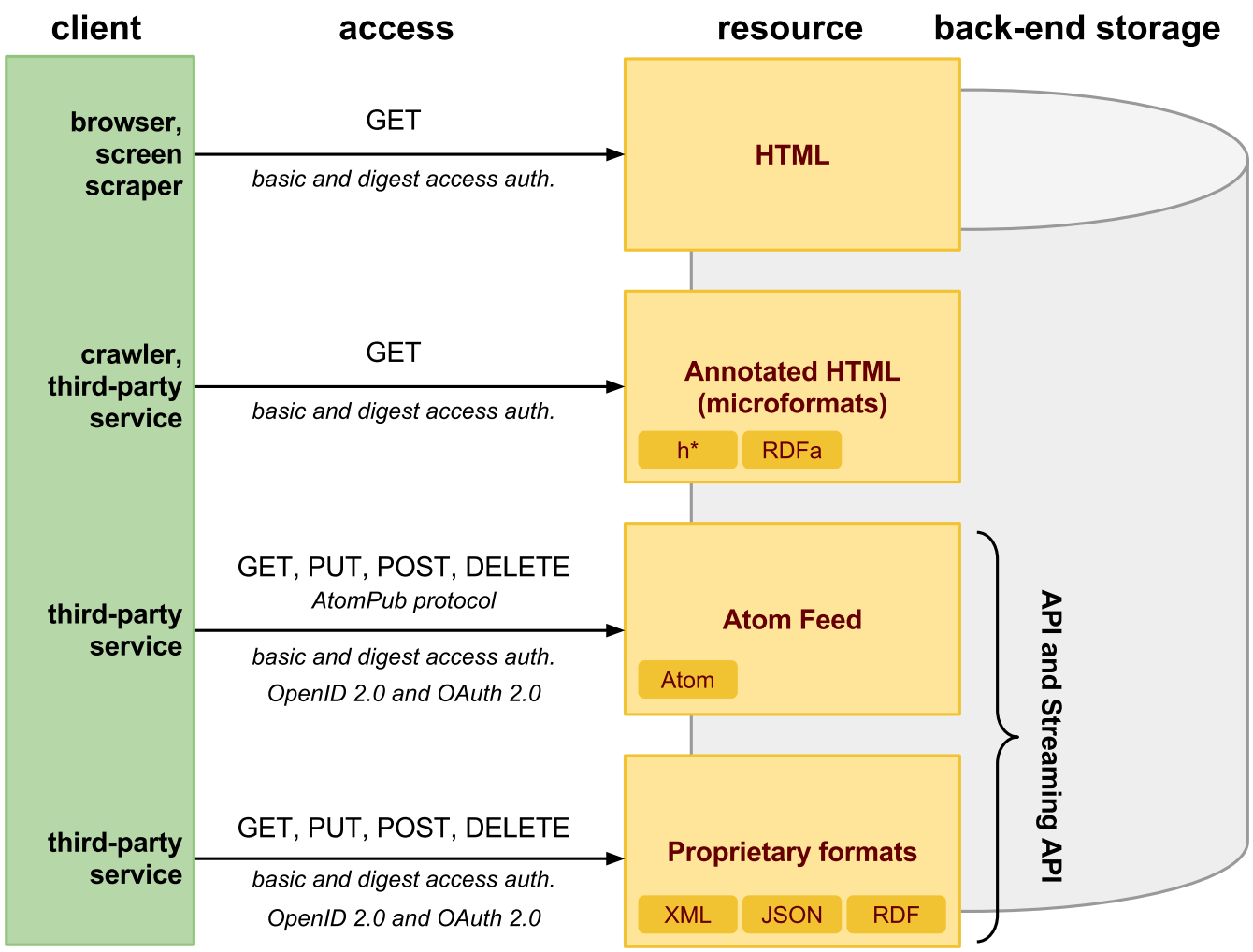
Overview

- Overview of Formats and Protocols
- Atom Syndication Format
- AtomPub Protocol

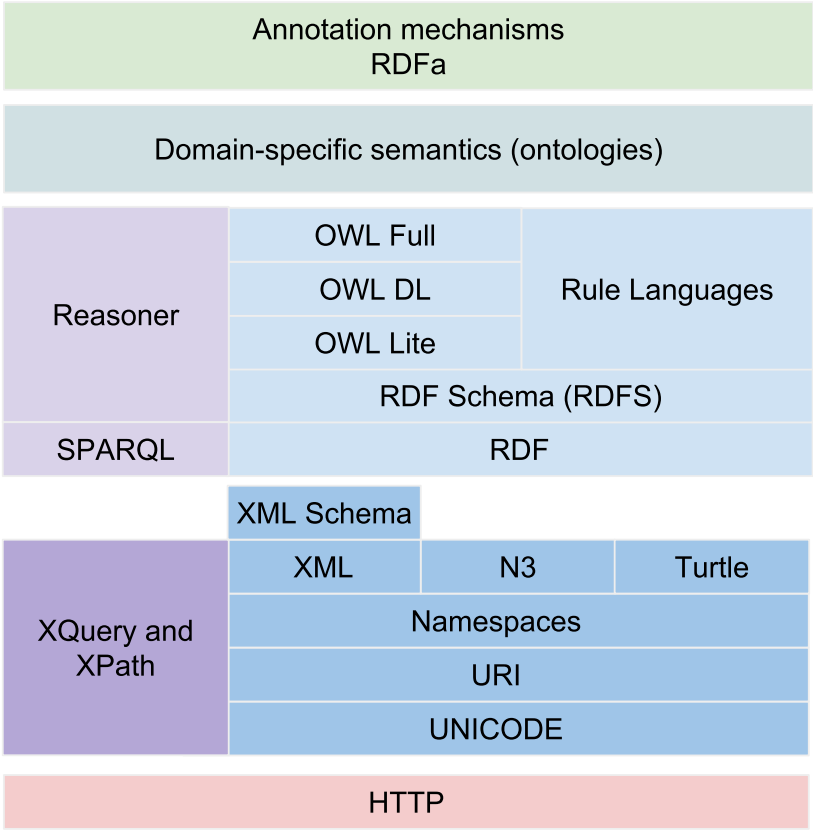
Data on the Web



Data Syntax, Structure and Semantics

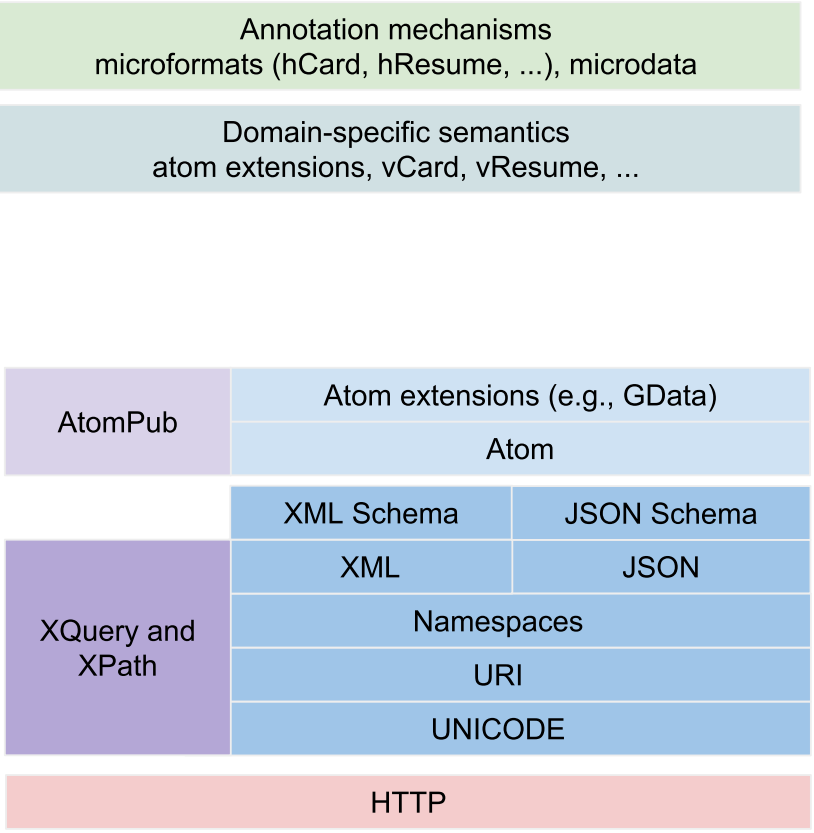
Semantic Web Layered Cake

syntax and formal semantics



Web Data Formats

syntax and semantics (structure)



Atom Standard

- A need for a standard syndication format
  - *machine-processable Web site content*
  - *Alternative to RSS*
    - → *RSS spec does not say how to encode content, strings only ASCII-encoded, not clearly defined meaning of RSS elements, etc.*
    - → *See RSS Flaws*
- IETF Atom Publishing Format and Protocol WG
  - *RFC 4287: Atom Syndication Format*
  - *RFC 5023: Atom Publishing Protocol*
- Adoption
  - *Google: Google Data Protocol (GData)*
  - *Microsoft: Open Data Protocol (OData)*

Overview

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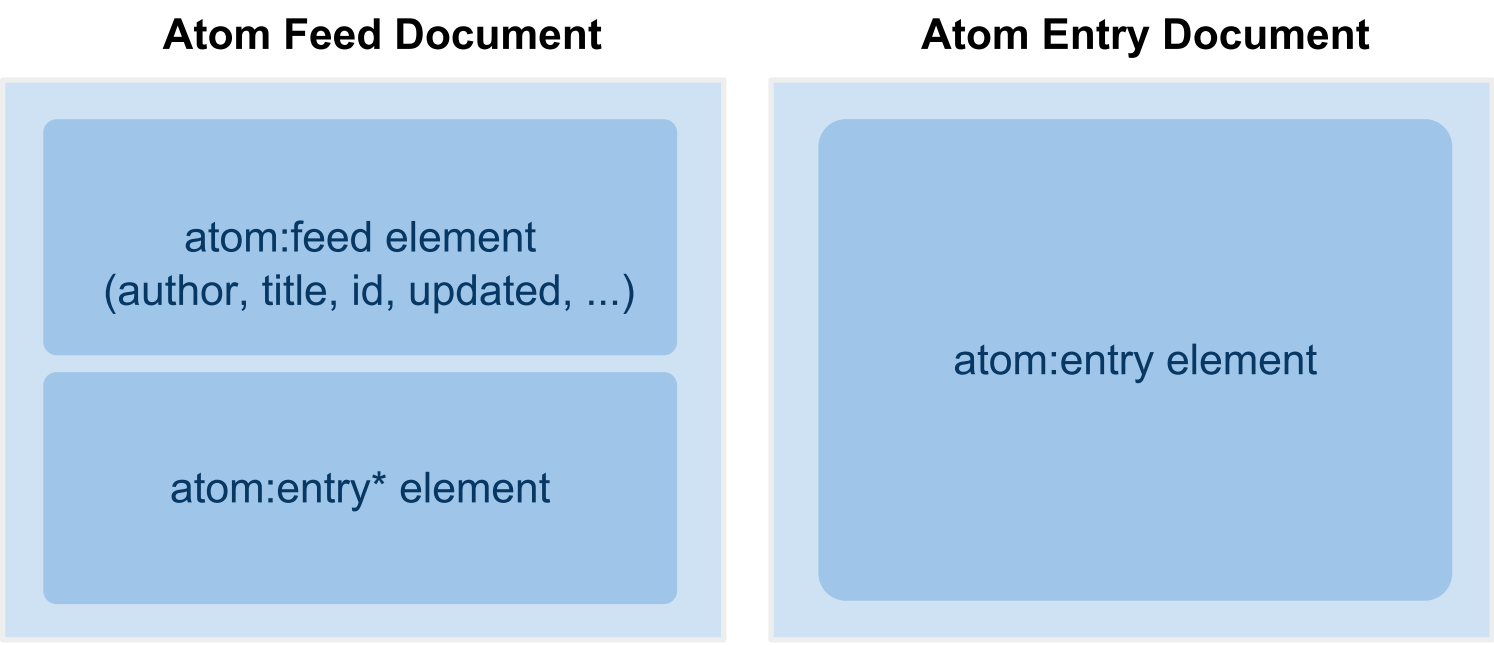
Atom Syndication Format



- Two types of atom documents
  - *Atom Feed Document*
    - → *represents an atom feed, its metadata and some or all entries associated with it.*
  - *Atom Entry Document*
    - → *represents exactly one entry, outside of context of atom feed*

Atom Syndication Format

- Atom Feed Document Example

Atom Elements – Atom Feed

- Specification
  - *defined as XML information set, serialized as XML 1.0*
  - *must be well-formed, no DTD/Schema → no requirements to be valid.*
- `atom:feed` element
  - `(*)`: *zero or more occurencies – repeating fields*
  - `(?)`: *zero or one occurence – non-repeating fields*
  - `( )`: *exactly one occurence – non-repeating fields*

Atom Elements – Atom Entry

- `atom:entry` element

  `(*)`: *zero or more occurencies – repeating fields*

  `(?)`: *zero or one occurence – non-repeating fields*

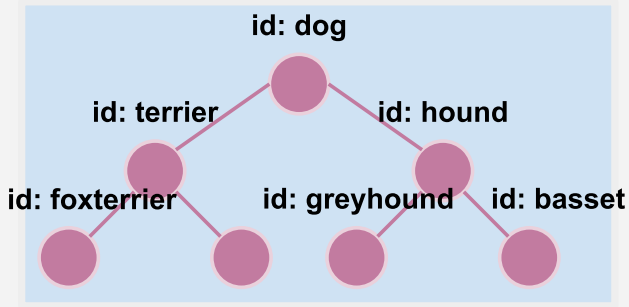
  `( )`: *exactly one occurence – non-repeating fields*

Pointers to other information

- URI identifier
  - *unique identification of things*
  - *feed/entry* `id`
  - `author` *and* `contributor` *(person uri)*
  - `generator` *(uri)*
  - `category` *schema (uri), term (uri)*

    example:

Example category schema
URI: http://example.org/dogs



- Unambiguous identification of things using URIs
  - *Helps interoperability, can take advantage of wikipedia concepts*
    → still not very common, will improve with linked data

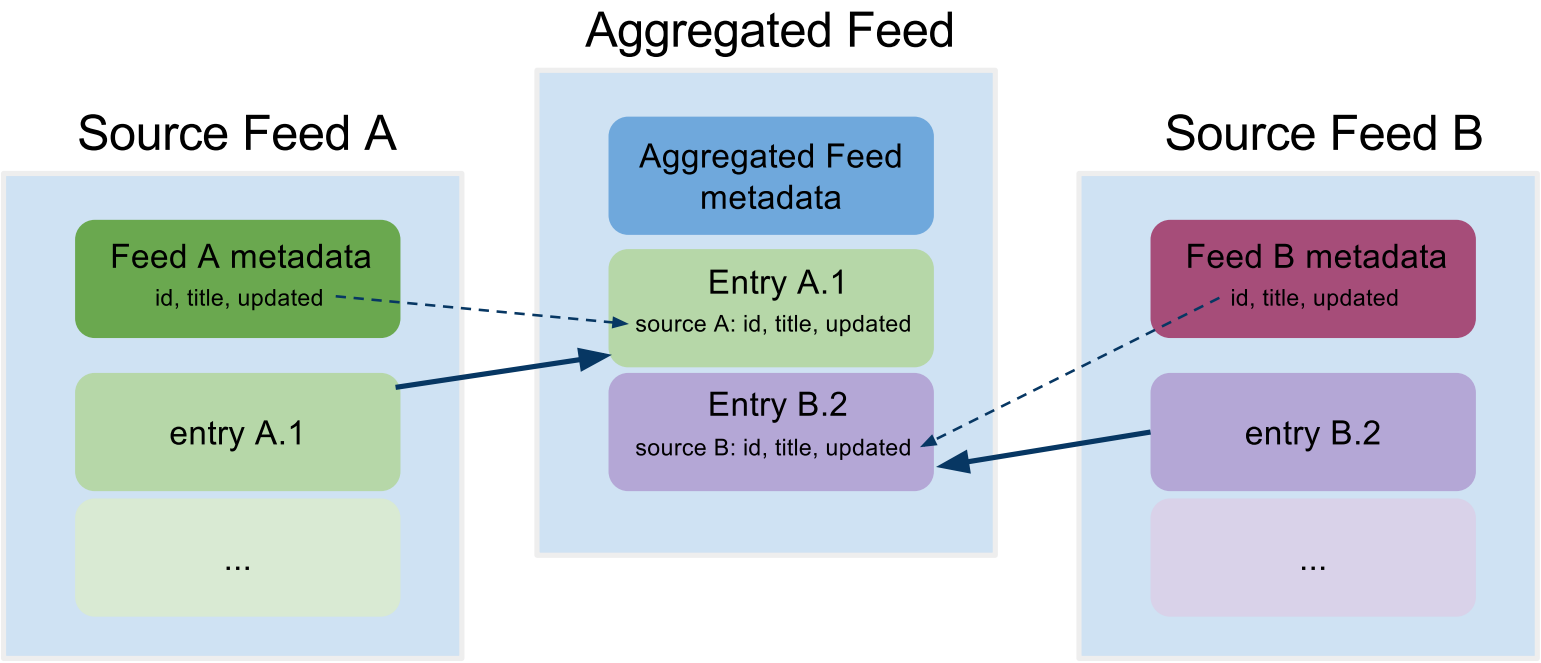
Atom Links

- Links to other Atom documents
  - *Atom defines simple link structure*
  - `type` *defines content type*
  - `rel` *defines relation to this resource*
    - → *self, alternate, related, enclosure, via*
    - → *standardized by IANA*
- Adoption by RESTful services
  - *Core for HATEOAS*
  - *Adopted in Link header, see Web Linking*
  - *More details in Lecture 4 – HATEOAS.*

Encoding Textual Content

- Plain text
  – *simple text, must not contain child elements*
- HTML
  – *html text, must not contain child elements*
  – *any markup must be escaped,*
  – *should be possible to display it as HTML inside* `<div>` *element*
- XHTML
  – *the value is a single xhtml* `<div>` *element, not part of the content*

Aggregation



- *Atom feed may include entries from another atom feed*
  → these entries do not originally belong to this feed
- `source` *element should contain at least:*
  → required atom feed's metadata `id`, `title` *and* `updated`
- *retains information about an entry's source feed*

Data and Time

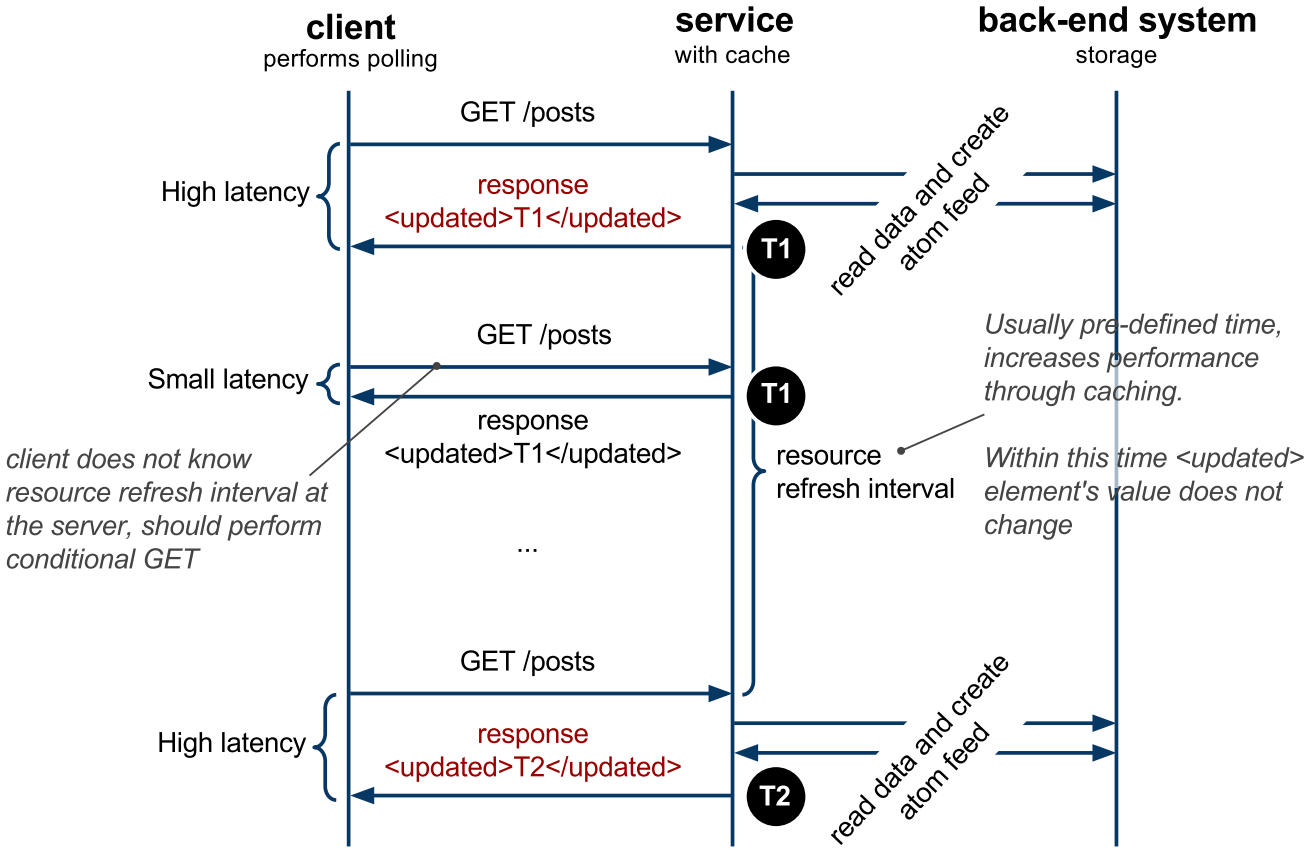
- Notion of time
  - *Atom document is a snapshot of resource in some time*
  - `updated` *(feed, entry) – last update of the resource*
  - `published` *(entry) – initial creation of the first availability of the resource*
- Data format
  - *Examples:*

    `T` *– time delimiter*

    `Z` *– identifies UTC time (~GMT)*

    `(+|-)hh:mm` *– defines local time and a shift in hours and minutes from the UTC time*

Polling



- `updated` *is the last updated time of the resource at the server*
- *resource refresh interval is pre-defined by the serice*

Extensions

- Possible to combine various vocabularies
  - *through namespaces* `xmlns` *attribute, extensions of* `link.rel` *attribute*
- Example: GData (PicasaWeb, Docs, ...)
  - *combines vocabularies such as Geo location*

Overview

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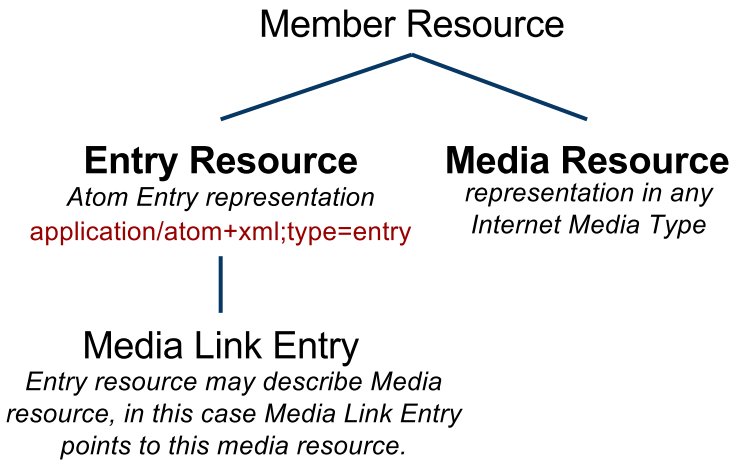
- AtomPub Protocol
  - *Extensions*

AtomPub Protocol

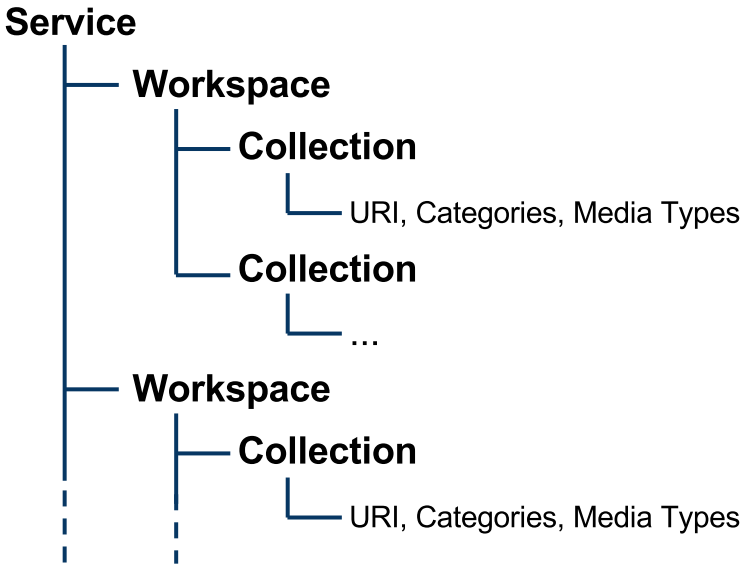
- Standard protocol for manipulation of resources
  - *Defines a service description by following constructs*
    - → `service` – *a set of workspaces*
    - → `workspace` – *a set of collections*
    - → `collection` – *a set of resources*
  - *Defines protocol for editing, that is: creating (POST), updating (PUT), reading (GET), deleting (DELETE)*
- Relation to Atom Syndication Format
  - *Atom Feed and Atom Entry as resource representations*
- Basis for many, such as:
  - *Google Data Protocol (GData)*
  - *Microsoft Open Protocol (OData)*

AtomPub Elements

Types of Member Resources



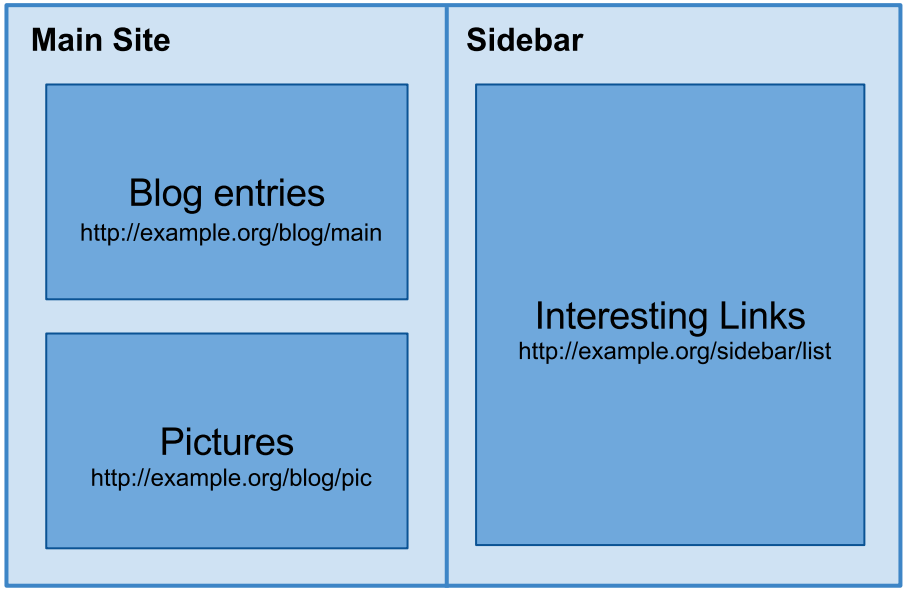
AtomPub Service Description



- Collection properties and definition of constraints
  - `URI` – *id of the collection (Atom Feed)*
  - `categories` – *list of allowed categories in the collection*
  - `accept` – *list of Internet media types allowed in the collection*
  - ***URI points to an Atom Feed resource!***

Example Blogging Site Description

Conceptual structure of a blogging site



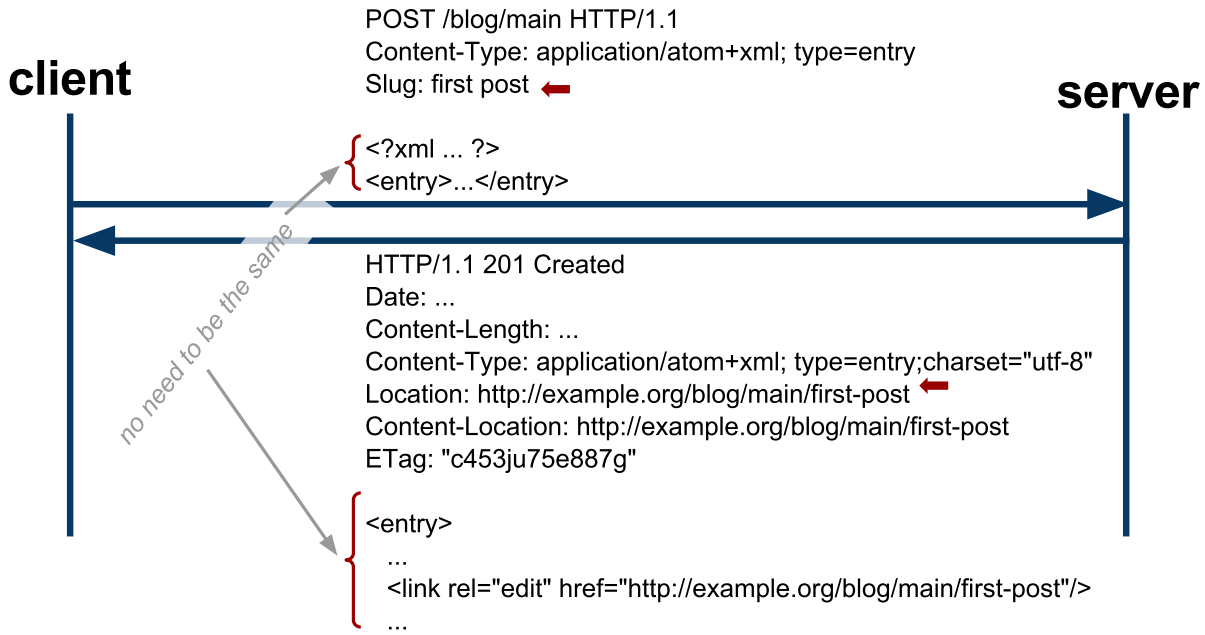
- Workspaces
  – *Main Site, Sidebar*
- Collections
  – *Blog entries, pictures, interesting links*

Example Blogging Site Description

Protocol Operations

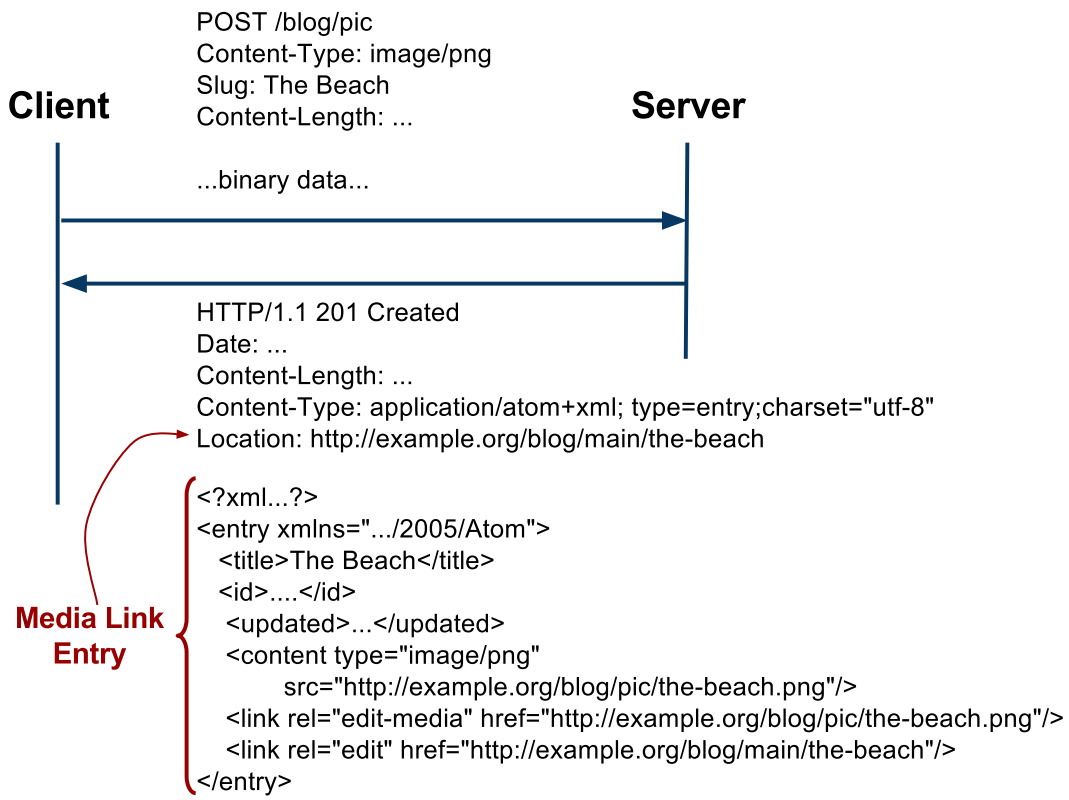
- Operations to manipulate resources
  - *Retrieving a service document (is obvious, GET)*
  - *Listing collection members (filtering and projections)*
  - *Creating a resource (entry and media)*
  - *Editing a resource (is obvious, PUT and DELETE)*
- AtomPub **does not define:**
  - *Any manipulation with*
    → service documents, workspaces and collections
  - *How service documents are discovered*
- AtomPub may be used w/o service descriptions
  - *They're good for discovering constraints on the service*
  - *They're not a requirement*
  - *For example, GData does not have them*

Creating Entry Resource



- *Server checks constraints of the collection*
- *Server may modify member representation*
  → *such as changes* `id`*, adds* `updated` *element*
- *if* `Content-Location` *is not equal to* `Location` *the request and response representation are not the same!*
- `ETag` *should be used for*
  → *conditional GET and PUT (see lecture 4 – scalability)*

Creating Media Resource



- *Server checks the constraints of the collection*
  - → *may return* `415 Unsupported Media Type` *if not accepted*
- *Media Link Entry is an Entry resource that describes metadata about media resource (such as a picture)*

Listing Collection

- Must provide representation in Atom Feed
- Contains list of Atom `Entry` elements
  - *must have* `link` *with attribute* `edit`
  - *must have* `edited`*, order of entries by this date*
    → *is not the same as* `Last-Modified` *header*
- Entries in collection are not full representations
  - *clients should retrieve them using GET on entry URI*
- To limit amount of entries
  - *links with semantics for navigation through the whole list*

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Extensions

- OpenSearch
  - *Specification: OpenSearch*
  - *Search service description and search results*
- Google Data Protocol
  - *Filtering, partial response and partial update*
  - *Entity tag attribute for* `<feed>` *and* `<entry>` *elements*
  - *HTTP methods overriding*

OpenSearch

- Open Search Specification
  - ***Open Search Description Document (OSDD)***
    → description of a search service
  - ***OpenSearch Response Document***
    → Standard description of search results by search services
    → extension of syndication formats, RSS and Atom
- Adoption
  - *Browsers such as IE, Google Chrome – search engines you can use to search various sites.*
  - *APIs such as Bing API, Google Docs, etc. – description of search results.*

OpenSearch Description Document

- Example:
  - `searchTerms` *is a free text*

OpenSearch Response Document

- Example:
  - *Result in Atom format of a search query*

GData Protocol: Advanced Search Query

- OpenSearch does not specify syntax for search query
  - *It can be anything, free text*
  - *GData Protocol further allows for filtering and projection*
- Filtering
  - *Fine-grained conditions based on values of various elements*
    - → *such as* `author`, `category`, `max-results`, *min and max of* `published` *and* `updated` *elements.*
- Partial Response (~Projection)
  - *Which elements of an entry should appear in the search result*
  - *A language based on XPath syntax (subset of a valid XPath expression)*

GData Protocol: Partial Update

- `PATCH` HTTP Method
  - *IETF specification, see PATCH Method for HTTP*
  - *Add, modify or delete selected elements of an entry*
- Examples
  - *To delete a description element and add a new title element*
  - `gd:fields` *uses partial response syntax*
- Rules
  - *Fields not already present are added*
  - *Non-repeating fields already present are updated*
  - *Repeating fields already present are appended*

GData Protocol: Entity Tags

- Resource Versioning
  - *Conditional GET and PUT (concurrencyl control)*
    → See Lecture 4 – scalability
  - *Etgas on atom and entry elements*
- Example
  - *It is possible to do a conditional GET/PUT on the entry by using the ETag* `"CUUEQX47eCp7ImA9WxRVEkQ."`

GData Protocol: HTTP Methods Overriding

- Firewall restrictions
  - *Some firewall configurations do not allow to send HTTP request other than GET and POST*
- HTTP methods overriding through `POST`
- Example