

W3C WoT – Hypermedia Controls

Hypermedia Call, 17 Oct 2018

Central Working Assumption

Links

- Hypermedia control to discover resources and switch context by "following a link"
- Describes a relation

Forms

- Hypermedia control to describe possible operations within a context by "submitting a form"
- Describes an operation
- Terminology is tricky; picked "operation" to grasp common understanding; "forms" hits resistance; "rel" became "op"

Entry Point (e.g., Thing Directory)

Entry point URI



<http://thing-directory.example.com/>

Thing Directory Representation (link-format-json)

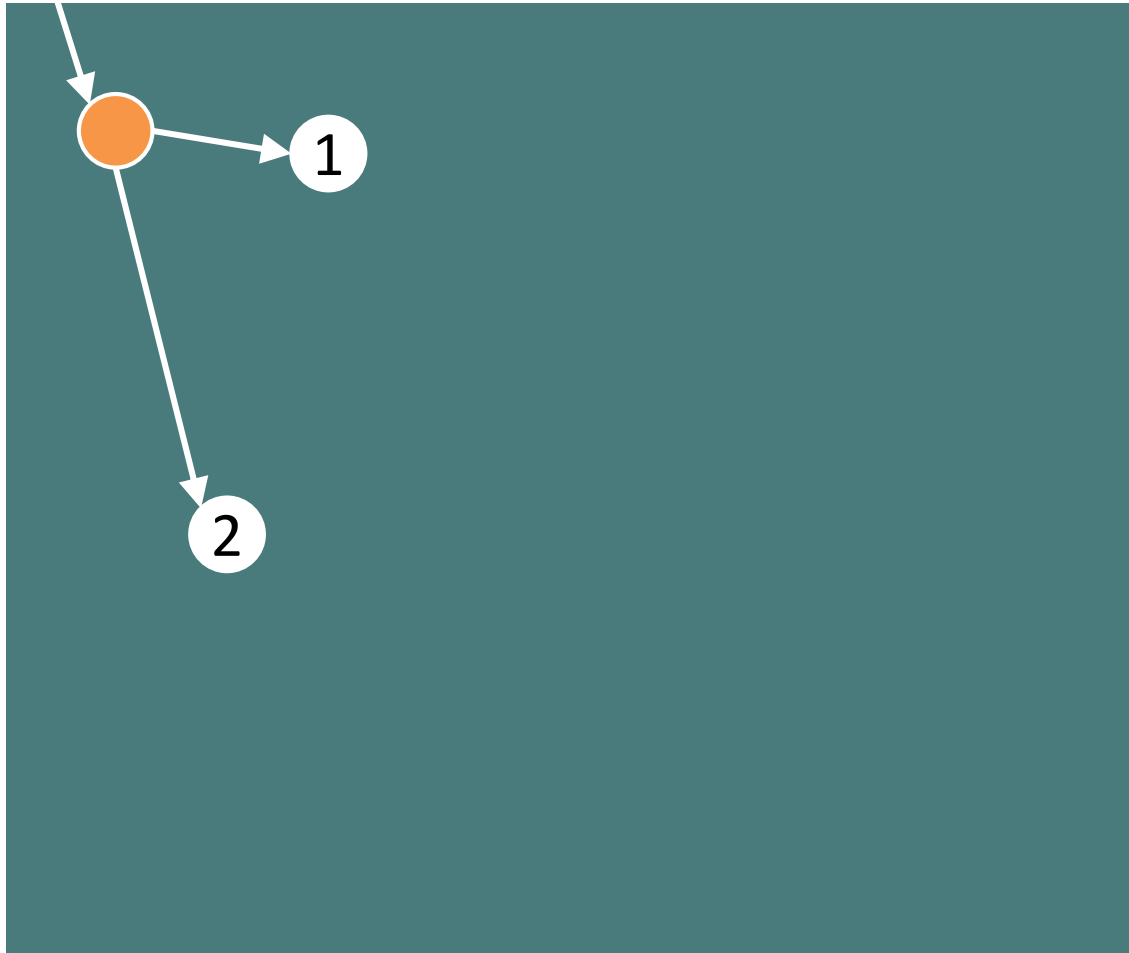
Entry point URI



```
[  
  {  
    "href": "http://t1.example.com/",  
    "rel": "thing",  
    "type": "application/x.td-edu+json"  
  },  
  {  
    "href": "http://t2.example.com/",  
    "rel": "thing",  
    "type": "application/x.td-edu+json"  
  }  
]
```

Thing Directory Representation (link-format-json)

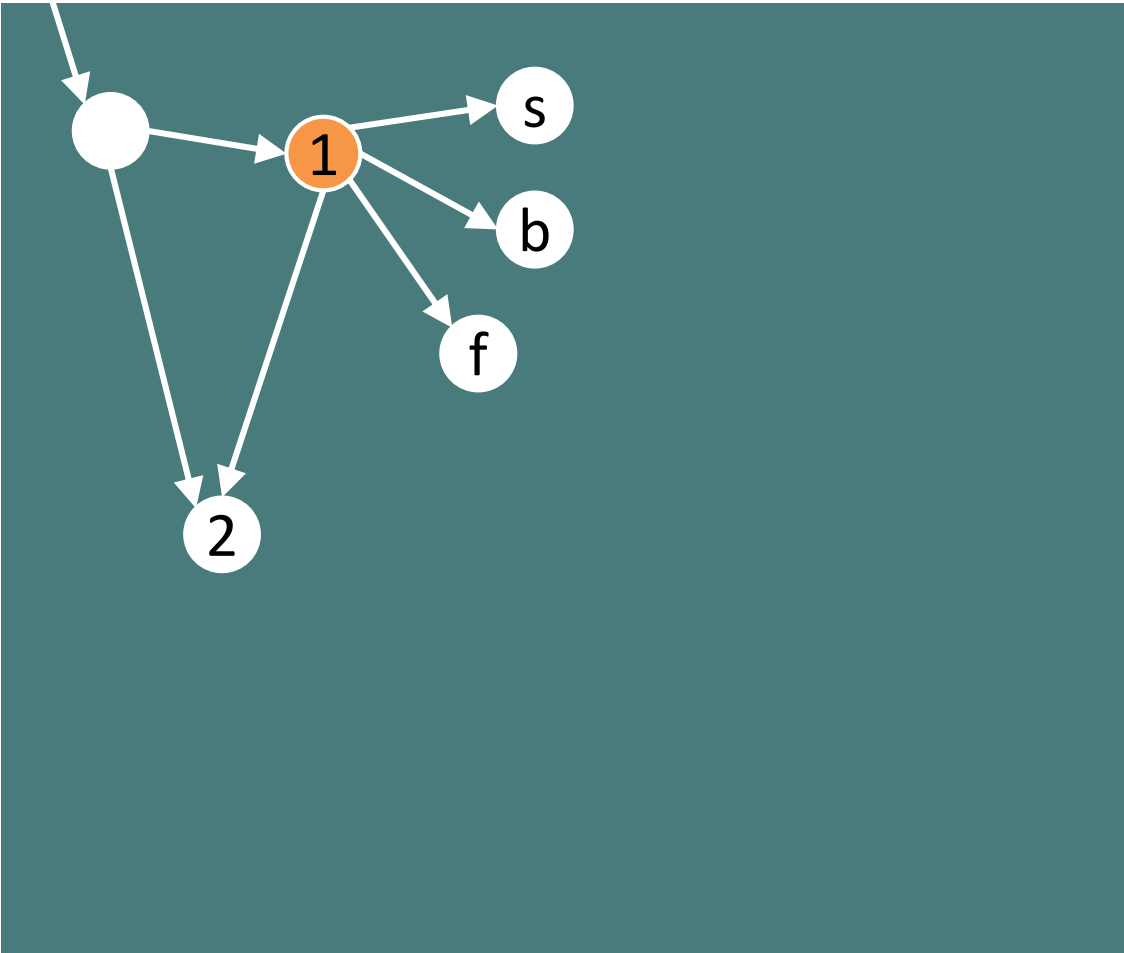
Entry point URI



```
[  
  {  
    "href": "http://t1.example.com/",  
    "rel": "thing",  
    "type": "application/x.td-edu+json"  
  },  
  {  
    "href": "http://t2.example.com/",  
    "rel": "thing",  
    "type": "application/x.td-edu+json"  
  }  
]
```

Thing Context (application/x.td-edu+json)

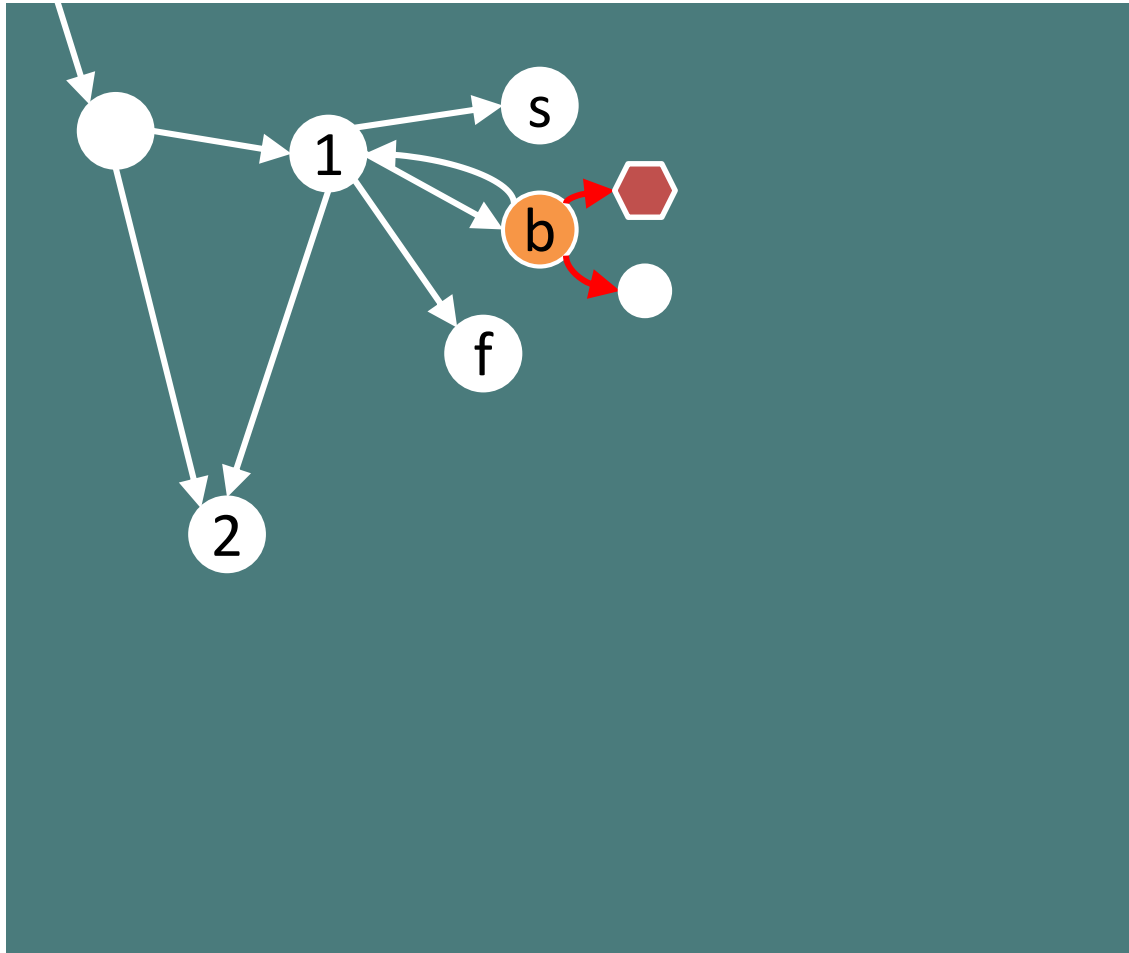
Invented TD variant for Educational Purposes



```
{  
  "id": "urn:dev:org:32473:1234567890",  
  "name": "Thing1",  
  "@type": ["Thing", "iot:LightControl"],  
  "links": [{  
    "href": "http://t1.example.com/properties/status",  
    "rel": "property",  
    "type": "application/x.td-edu+json"  
  }, {  
    "href": "http://t1.example.com/properties/brighness",  
    "rel": "property",  
    "type": "application/x.td-edu+json"  
  }, {  
    "href": "http://t1.example.com/actions/fade",  
    "rel": "action",  
    "type": "application/x.td-edu+json"  
  }, {  
    "href": "http://t2.example.com/",  
    "rel": "thing", "controlledBy",  
    "type": "application/x.td-edu+json"  
  }]  
}
```

} Metadata

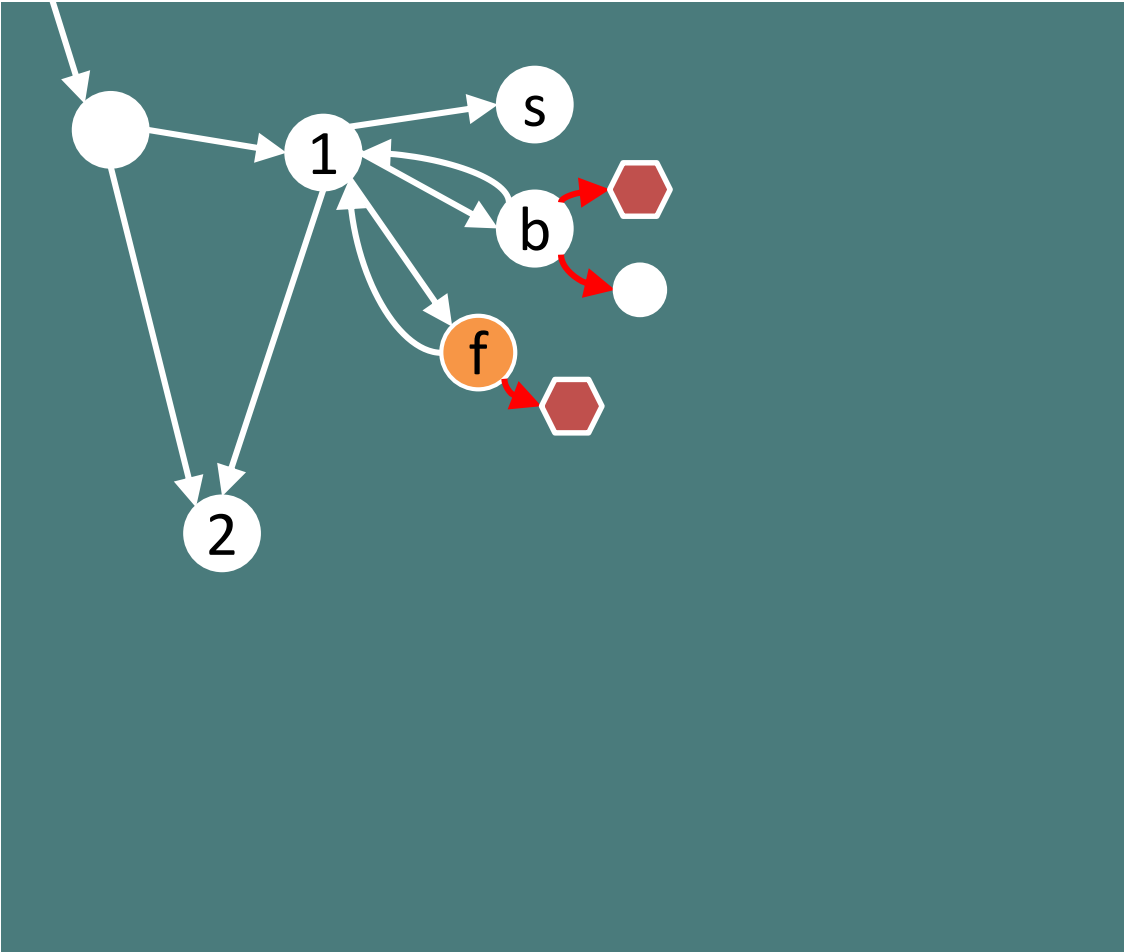
Property Context (application/x.td-edu+json)



 Action Result

```
{  
  "value": 42,  
  "@type": ["Property",  
            "iot:CurrentDimmer"],  
  "type": "integer",  
  "minimum": 0,  
  "maximum": 100,  
  "forms": [{  
    "href": "http://t1.example.com/properties/brightness",  
    "op": "writeproperty",  
    "method": "PUT",  
    "contenttype": "application/json" } type+parameters  
  ], {  
    "href": "http://t1.example.com/properties/brightness-obs",  
    "op": "observeproperty",  
    "method": "GET",  
    "subprotocol": "longpoll"  
  }  
],  
  "links": [{  
    "href": "http://t1.example.com/",  
    "rel": ["thing"]  
  }]  
}
```

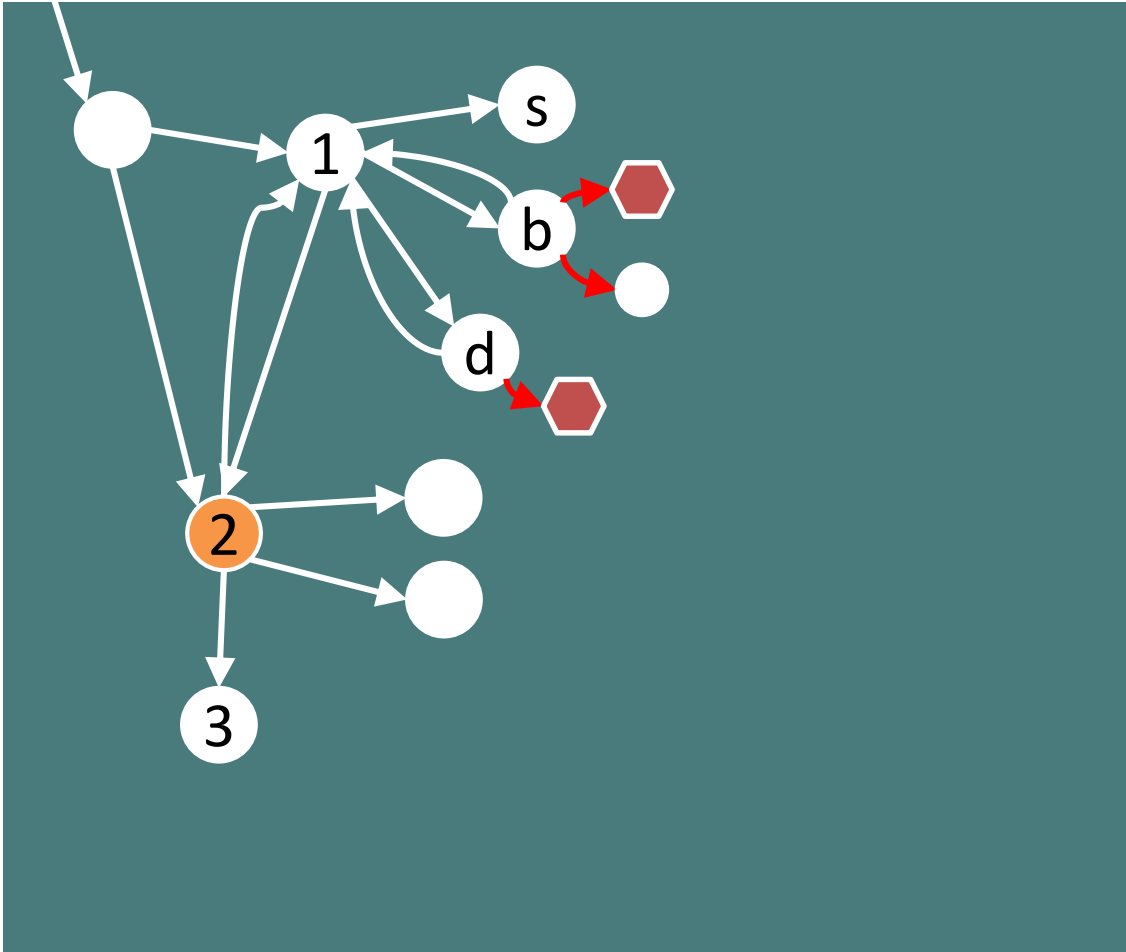
Action Context (application/x.td-edu+json)



```
{
  "@type": ["Action", "iot:SetLevel"],
  "input": {
    "type": "object",
    "properties": {
      "target": {
        "@type": "iot:CurrentDimmer",
        "type": "integer", "minimum": 0, "maximum": 100
      },
      "duration": {
        "@type": "iot:TransitionTime",
        "type": "number"
      }
    }
  },
  "forms": [{
    "href": "http://t1.example.com/actions/fade",
    "op": "invokeaction",
    "method": "POST",
    "contentType": "application/json"
  }],
  "links": [{
    "href": "http://t1.example.com/",
    "rel": ["thing"]
  }]
}
```

} Metadata

Thing Context (application/x.td-edu+json)



```
{
  "id": "urn:dev:org:32473:0987654321",
  "name": "Thing2",
  "@type": ["Thing", "iot:MotionControl"],

  "links": [
    {
      "href": "http://t2.example.com/properties/motion",
      "rel": "property",
      "type": "application/x.td-edu+json"
    }, {
      "href": "http://t2.example.com/properties/threshold",
      "rel": "property",
      "type": "application/x.td-edu+json"
    }, {
      "href": "http://t1.example.com/",
      "rel": "thing", "controls" ,
      "type": "application/x.td-edu+json"
    }, {
      "href": "http://t3.example.com/",
      "rel": "thing", "controls" ,
      "type": "application/x.td-edu+json"
    }
  ]
}
```

Actual TD with Embedded Properties/Actions

```
{
  "@context": [
    "http://www.w3.org/ns/td",
    { "iot": "http://iotschema.org/" }
  ],
  "id": "urn:dev:org:32473-lamp-4711",
  "name": "Lamp",
  "description": "Corner torchiere",
  "@type": ["Thing", "iot:LightControl"],
  "properties": {
    "status": {
      "type": "boolean",
      "forms": [{
        "href": "https://lamp.example.com/properties/status",
        "contentType": "application/json"
      }]
    },
    "brightness": {
      "@type": "iot:CurrentDimmer",
      "type": "integer",
      "minimum": 0,
      "maximum": 100,
      "writable": true,
      "forms": [{
        "href": "https://lamp.example.com/properties/brightness",
        "contentType": "application/json"
      }]
    }
  }
},
```

```
...
  "actions": {
    "fade": {
      "@type": "iot:SetLevel",
      "input": {
        "type": "object",
        "properties": {
          "target": {
            "@type": "iot:CurrentDimmer",
            "type": "integer",
            "minimum": 0,
            "maximum": 100
          },
          "duration": {
            "@type": "iot:TransitionTime",
            "type": "number"
          }
        }
      },
      "forms": [{
        "href": "/things/lamp/actions/fade",
        "contentType": "application/json"
      }]
    }
  },
  "links": [{
    "href": "https://servient.example.com/things/motion-detector",
    "rel": "iot:ControlledBy",
    "type": "application/td+json"
  }]
}
```

More Complex Request Metadata

Default assumptions apply
(GET to read, PUT to write)

Deviations from defaults

```
"properties": {  
  "brightness": {  
    "@type": "iot:CurrentDimmer",  
    "type": "integer",  
    "minimum": 0,  
    "maximum": 100,  
    "writable": true,  
    "forms": [{  
      "href": "https://lamp.example.com/properties/status",  
      "contentType": "application/json"  
    }]  
  },  
  "actions": {  
    "fade": {  
      ...  
      "forms": [{  
        "href": "coaps://myled.example.com:5684/pwr",  
        "contentType": "application/ocf+cbor",  
        "coap:methodCode": 3,           /// PUT instead of POST to invoke  
        "coap:options": [{  
          "coap:optionNumber": 2053,    /// OCF-Content-Format-Version  
          "coap:optionValue": "1.1.0"  
        }]  
      }]  
    }  
  }  
}
```

Contact

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