Representational State Transfer Architectural Style

Internet of Things

Rahul Shandilya

REST: Introduction

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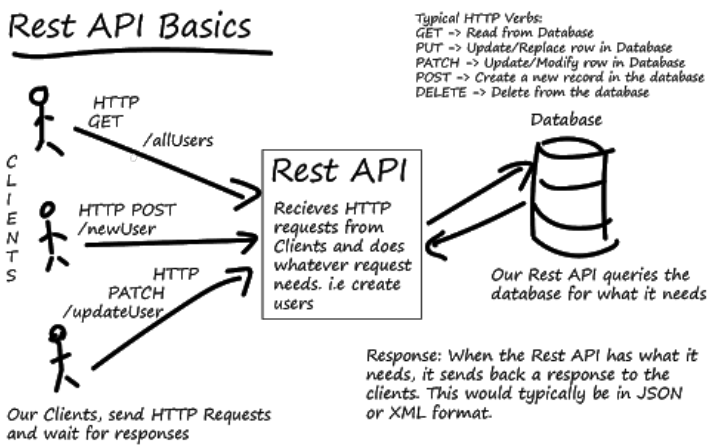

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- The same resource can have many different representations (1:N relationship): the state of the same sensor can be described using JSON, XML, or any other suitable format.

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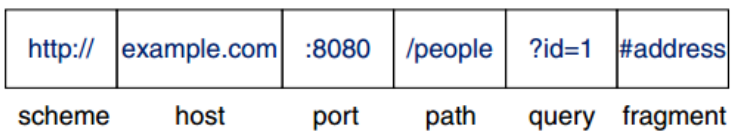
- All URIs take the following form: scheme:scheme-specificpart. The scheme part defines how the rest of the URI is to be interpreted – it typically serves as an indication of the communication protocol that should be used to target the resource.

- URLs include all the information needed to successfully address the resource. The host and optional port include networking information needed to reach to the resource.



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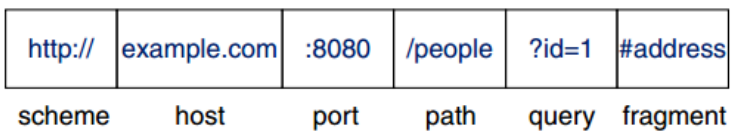

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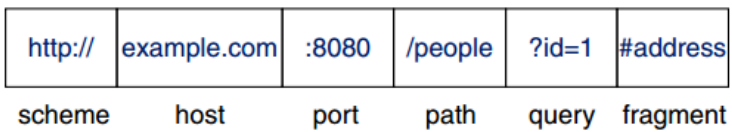

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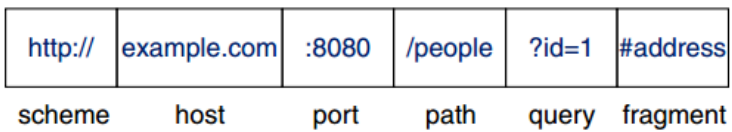

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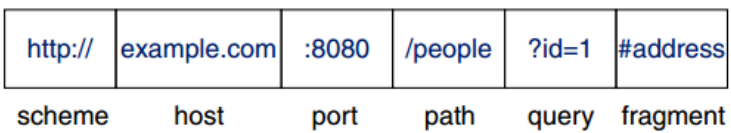
- URIs should be opaque and not expose any specific notion of the format used to represent the targeted resource.



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- There is no state information maintained between clients and servers: the state of the client is contained in the request, so the server is relieved from the burden of keeping track of the client state.

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- In essence, the state of the a resource identified by a URI is contained in the data section of the resource representation and the transition to the next states are contained in the links.

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- A client just needs to follow the instructions that the server transmits in order to reach its goal.
- This guarantees that, should the server change its implementation and introduce new functionality (states and links in the FSM), the client would be unaffected by these changes and could continue to operate.

Hypertext Transport Protocol (HTTP) Verbs

Action	Verb	Result
Create Data	POST	create a *resource* when you don't know URI, partial update of a *resource*, invoke arbitrary processing
Read Data	GET	retrieve a *representation* of the *resource*
Update Data	PUT	create a *resource* at a known URI or update an existing *resource* by replacing it
Delete Data	DELETE	delete a *resource*
List Data	GET	*perform get on a container using a path hierarchy*

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- The client selects a link to follow and issues the next request; that is, it triggers a transition to the next state.
- The client can also go back.

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- Performance and scalability - REST has better performance and scalability characteristics.
- REST architecture has intuitiveness, flexibility, better cache support, lightweight requests and responses, and easier response parsing.

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- Resource interface - uniform interface for accessing the resource and manipulating its state.

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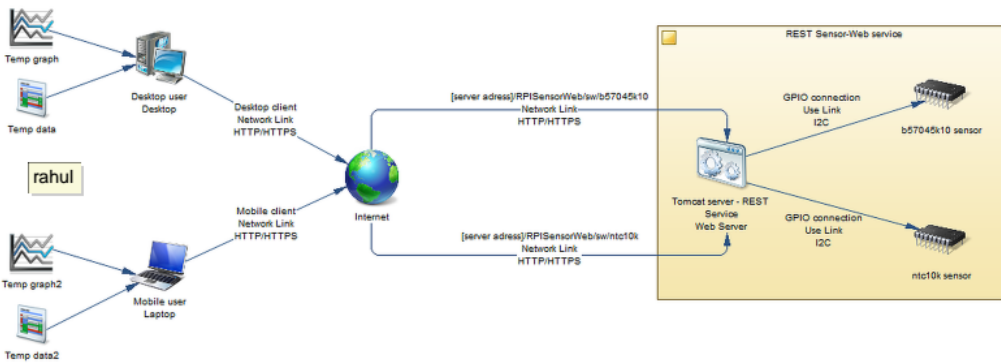
- Anything is identified: smart things are identified with a digital name; and
- Anything interacts: smart things can interact with the local environment through sensing and actuation capabilities whenever present.

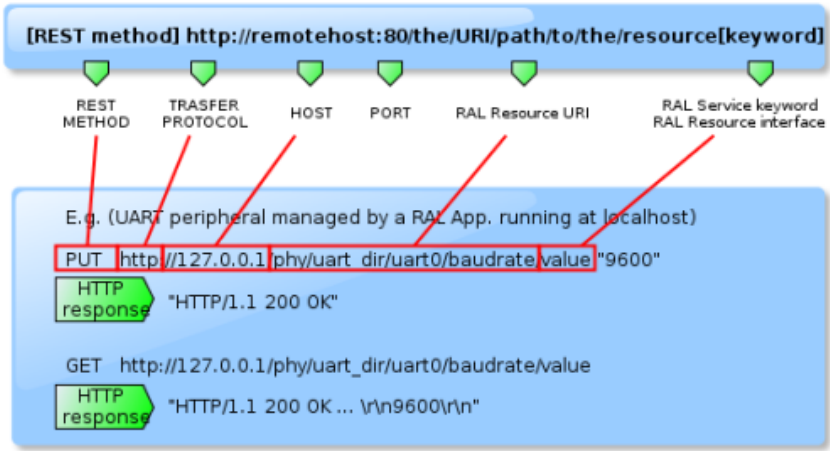
Smart things can be made as an integral part of the Web by their embedding into a standardized Web service architecture. Thus, the term "Web of Things", or WoT, can be considered as a part or a subset of IoT which incorporates similar characteristics and application models as IoT.

Redefining Resource for IOT

As specified by RFC 3986, any entity that has an identity can be a resource, even abstract concepts such as mathematical operators in an equation.
We can redefine resource to incorporate Smart Things.
"A Web resource is any real or abstract entity that can be identified and accessed within the IP network. A Web resource gives access to a specific functionality, or is part of a composition of other resources to provide a well-defined network application functionality."

IOT as REST architecture




[REST method] http://remotehost:80/the/URI/path/to/the/resource[keyword]
REST METHOD
TRASFER PROTOCOL
HOST
PORT
RAL Resource URI
RAL Service keyword
RAL Resource interface
E.g. (UART peripheral managed by a RAL App. running at localhost)
PUT http://127.0.0.1/phy/uart_dir/uart0/baudrate/value "9600"
HTTP response
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