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TUM

Evaluation of ROS as an Addition to the W3C WoT

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W3C WoT Binding Templates Taskforce Weekly Call

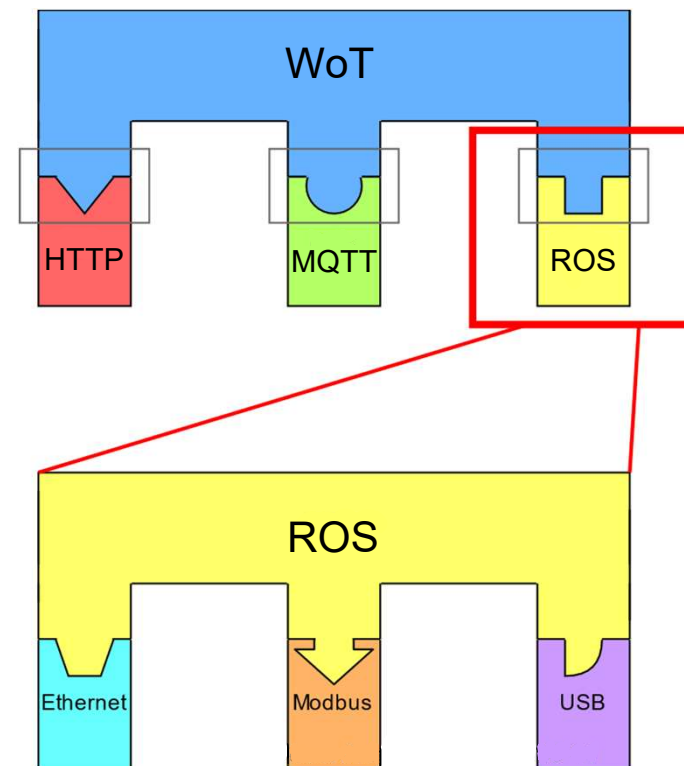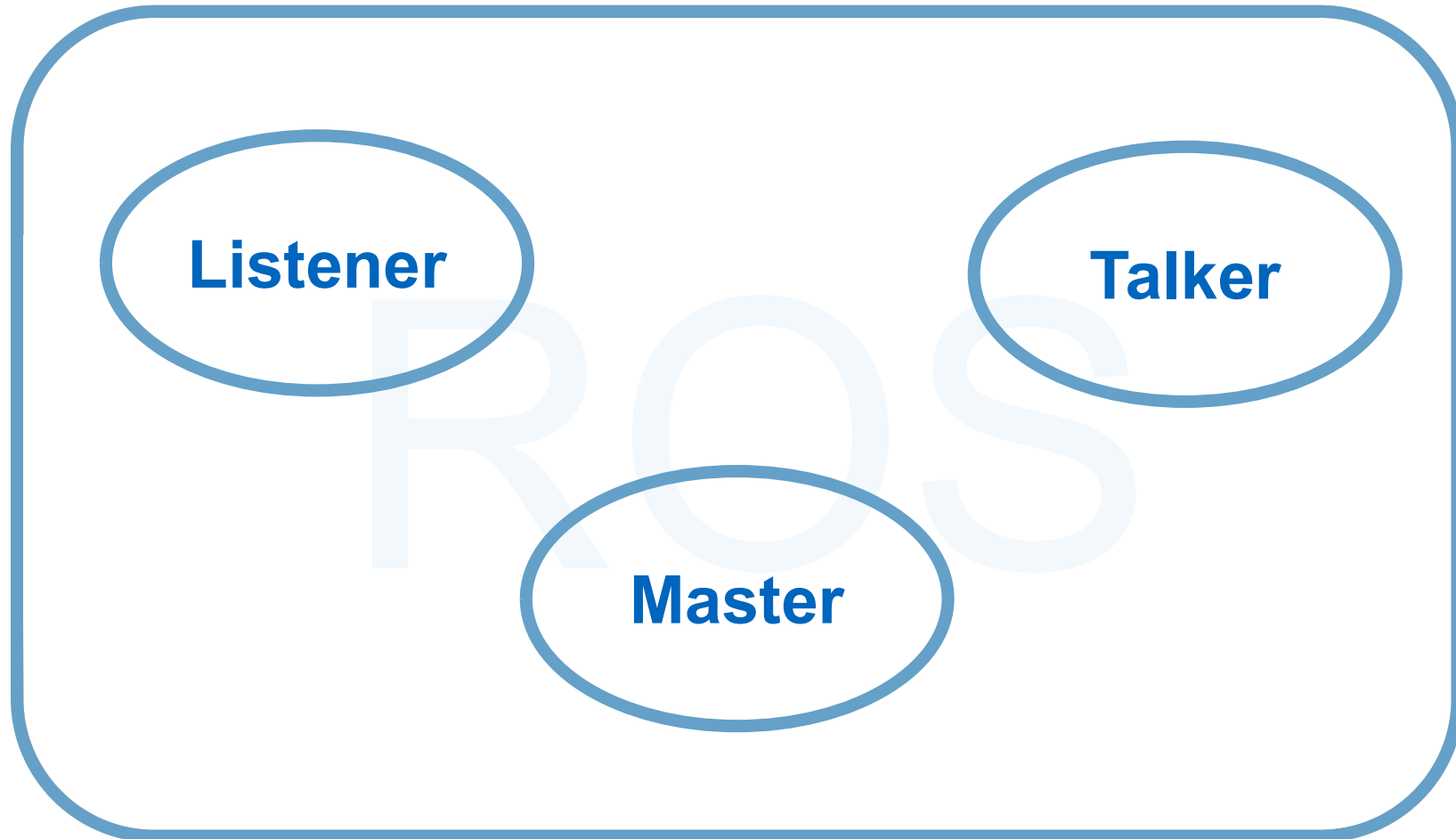Embedded Systems
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Robot Operating System (ROS)

- Open Source project for robotic frameworks

- Allows for various interfaces (e.g. Ethernet, Modbus, USB)

- Focus on reusability of code

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ROS Nodes

ROS Master Node

Only ONE per
ROS environment

Helps Nodes find
each other

Communicates
over XMLRPC

Provides a
parameter server

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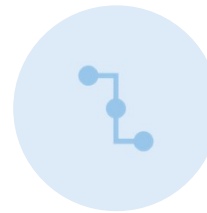
TLЛ

Simple ROS Nodes

Multiple Nodes per environment and device/robot
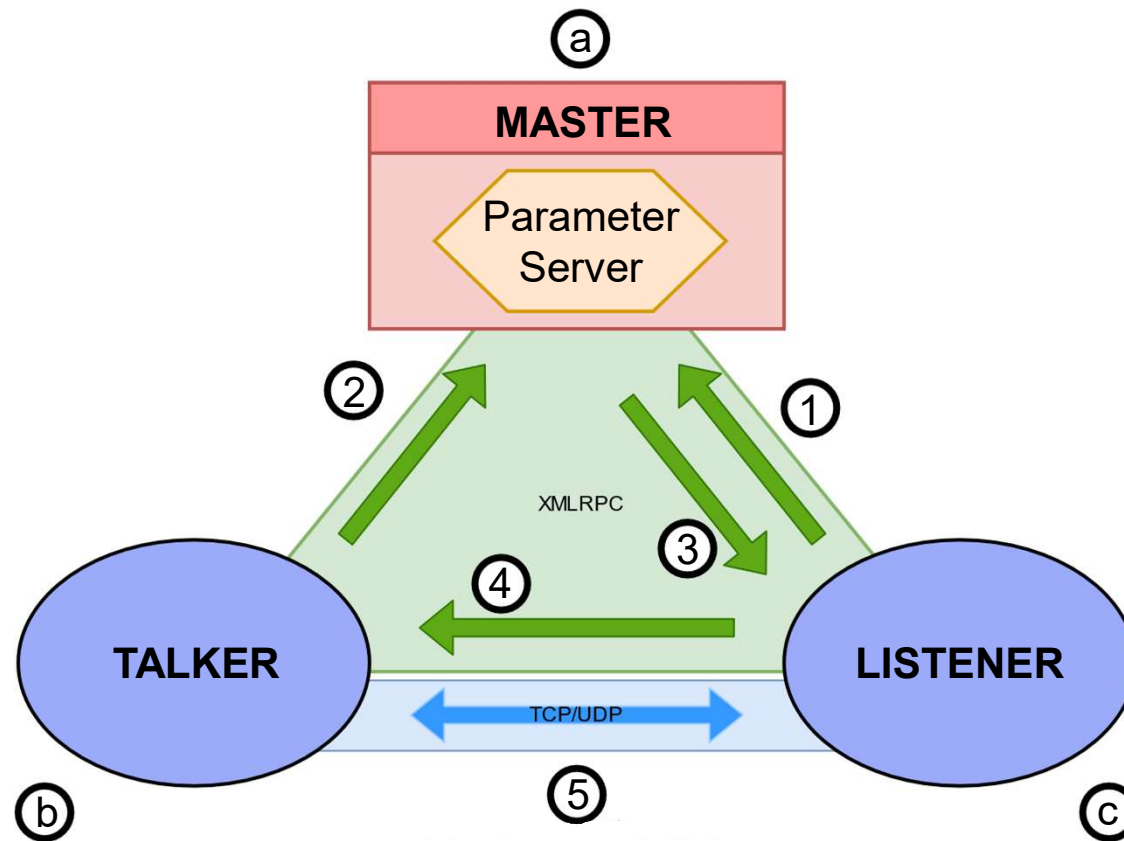
Nodes exchange data directly

Communicates over XMLRPC and other protocols

Nodes register themselves on the Master

ROS Architecture
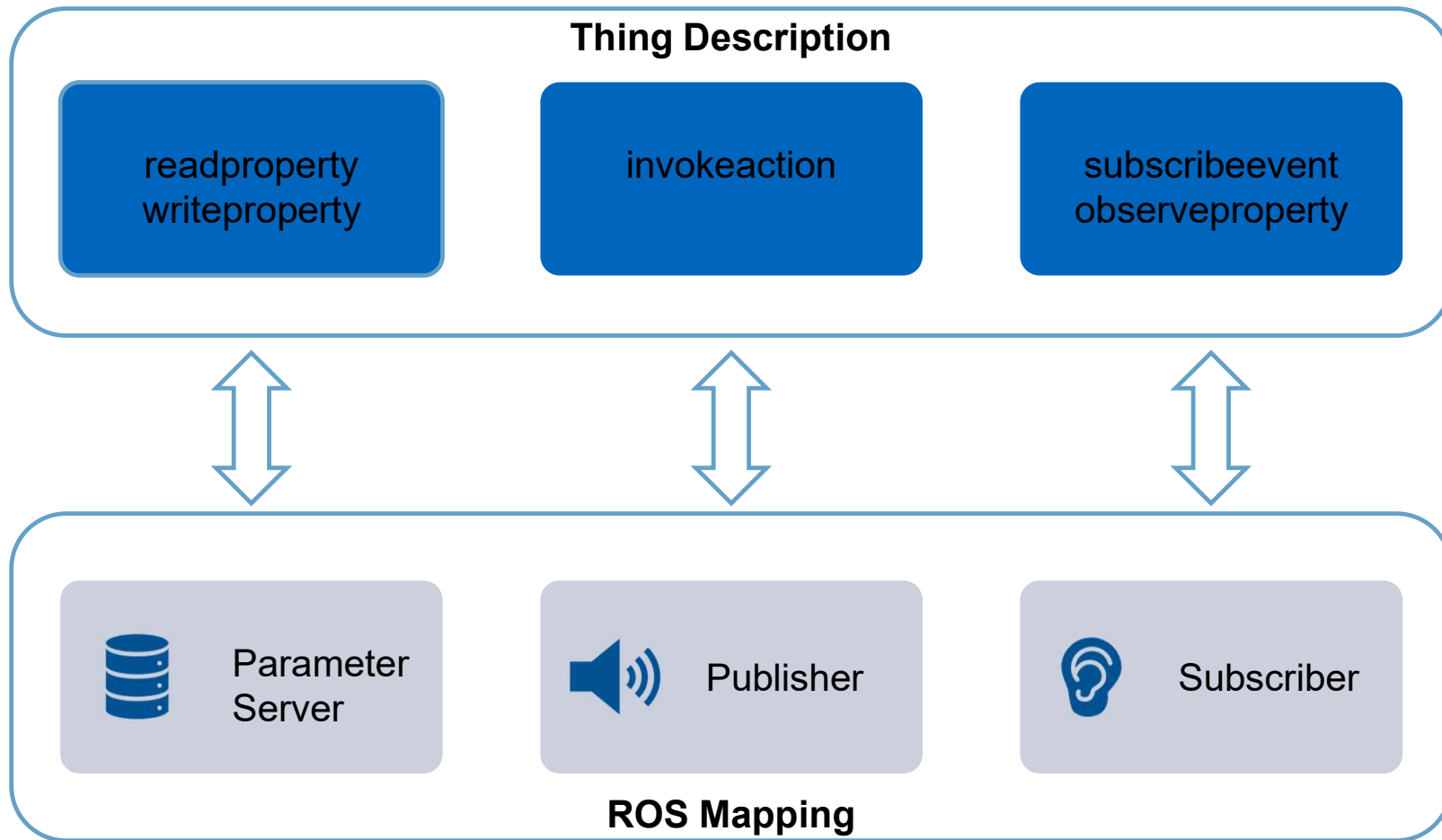
ROS and the W3C WoT

Publisher

Subscriber

Parameter Server

Services

W3C WoT Thing Description

What about Services

Publisher

Subscriber

Parameter Server

Services

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Thing Description Vocabulary

```
1    {
2    "@context": ["https://www.w3.org/2019/wot/td/v1",
3              {"ros":"http://www.example.org/ros-binding"}],
4    "title": "Uarm",
5    "properties": {
6         "location":{
7              "title":"Return location",
8              "type":"integer",
9              "forms": [{
10                  "href":"ros.xmlrpc://192.168.0.100:11311/uarm/properties/location",
11                  "contentType":"application/json",
12                  "op":"readproperty",
13                  "ros:methodName":"getParam"
14                  }]
15         }
16    },
17    "actions":{
18         "beep":{
19              "title":"Beep",
20              "forms":[{
21                  "href":"ros.tcp://192.168.0.100:11311/uarm/actions/beep",
22                  "contentType":"ROS/String",
23                  "op":"invokeaction",
24                  "ros:registerClass":"Publish"
25                  }]
26         }
27    },
28    "events":{
29         "error":{
30              "title":"Error Event",
31              "forms":[{
32                  "href":"ros.tcp://192.168.0.100:11311/uarm/events/error",
33                  "contentType":"ROS/String",
34                  "op":"subscribeevent",
35                  "ros:registerClass":"Subscribe"
36                  }]
37         }
38    }
39    }
```

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Vocabulary Table

Vocabulary	Description	Type
ros:methodName	Defines the interaction method	"getParam", "setParam"
ros:registerClass	Defines the object class	"Publish", "Subscribe", ("Service")

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Vocabulary Mapping

op value	ROS
readproperty	getParam
writeproperty	setParam
observeproperty	Subscribe
invokeaction	Publish
subscribeevent	Subscribe

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Dicussion

Relevant Github Issue:

https://github.com/w3c/wot-thing-description/issues/912

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Conclusion

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Thank you for your attention

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