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Aerospace Information Technology

RODOS

RODOS tutorial ABC (Alice Bob Charly)

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This tutorial shows how to build bigger systems using very simple components (building blocks).

1. How to begin

Read and understand first the RODOS-Tutorial and then the RODOS-Middleware tutorial.

Use

```
% rodos-executable.sh linuxMC <list of sources>
```

to compile and

```
% tst
```

to execute – e.g.

```
% rodos-executable.sh linuxMC alice-bob-charly.cpp
% tst
```

For each example programme please first read and understand the code, then compile and execute and see if it acts as expected. Then modify and continue trying.

2. Useful to know

The middleware communication is based on a publisher/subscriber protocol. This is a multicast protocol. There is no connection from a sender to a receiver (connectionless).

Publishers make messages public under a given topic.

Subscribers to a given topic get all messages which are published under the given topic.

To establish a transfer path, both the publisher and subscriber have to share the same topic.

A Topic is a pair - data-type and an integer representing a topic identifier.

To match a communication pair, both data-type and topic identifier must match.

For a topic there may be zero, one or several subscribers. A message which is published under a topic will be distributed to 0 or more subscribers.

Each subscriber has a reference to the associated topic and a “putter” to store messages. Or in this more simple example threads may be waiting for messages. If a message is published while a thread is waiting for it, the thread will get a copy of the message else not.

All subscribers are registered in a list. Each time a message is published the list of all subscribers will be searched and for each subscriber where the topic matches the associated putter will be called to store a copy of the published message.

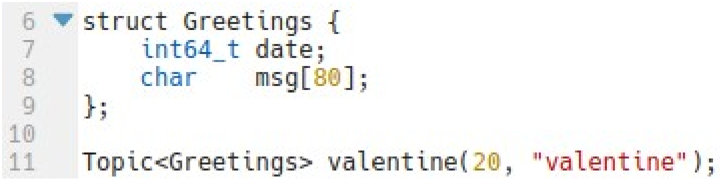
Using a network interface and the corresponding gateways, the middleware may make the node borders transparent. Applications running on different computers may communicate as if they were on the same computer (not in this example).

3. Examples

alice_bob_charly.cpp : This is a short demonstration of threads communicating by publishing messages and threads waiting for them. To see more elaborated publisher/Subscriber communication please refer to tutorial_middleware.

```
% rodos-executable.sh linuxMC  alice-bob-charly.cpp
% tst
```

Alice, Bob and Charly share communication topics:



```
 6  struct Greetings {
 7      int64_t date;
 8      char    msg[80];
 9  };
10
11  Topic<Greetings> valentine(20, "valentine");
```

Figure 1: Example topic with a struct

Bob publishes a message after 2 seconds (see `#define VALENTINE_DAY 2*SECONDS`, line 13) and Alice waits for it.

After Bob publishes the message (line 41), Alice can receive the message (line 54) she is waiting for.

Charly only receives the second message (sent in line 45) as Charly is only a

TopicFilter and not a subscriber. Charly only receives messages after set as a TopicFilter for `valentine` in line 44.

A topic may not have more than one filter. After the message is published, the `prolog` (line 20) is called, then all subscribers (here only Alice), then the `epilog` (line 24).

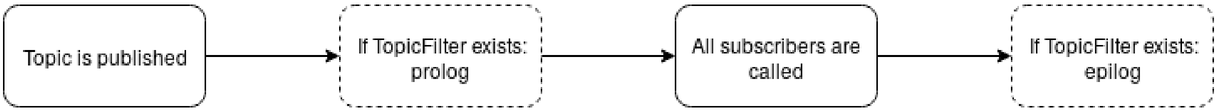

Topic is published
If TopicFilter exists: prolog
All subscribers are called
If TopicFilter exists: epilog

Figure 2: Sequence of events after a Topic is published