CSSE 7014 Distributed Computing

Assignment 2 – Task B

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Team B

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Question: Analyse which inter-process communication required in the application described in assignment 1 would be difficult to implement in Web Services. Explain why.

Answer:

There are two kinds of communications involved in assignment 1, namely:

- Event notification using Publish/Subscribe.

  All sensors send data to Home Manager, Home Manager sends warnings to User Interface and also puts the temperature sensor into periodic and non periodic mode using this kind of communication.

- Remote Procedure Invocation

  The user query on the temperature log and health warnings log is answered using Remote procedure call that is executed on Home Manager and the results are returned to User Interface.

The most difficult inter-process communication to implement using Web Services is Event notification. In this kind of notification, the publisher would just publish its message using attribute value pair and the interested process or processes get the messages by subscribing to such messages.

This type of communication is difficult to implement because in the web services, the client requests the information and the server replies back. In assignment 1, the home manager receives data from the sensors. Thus this can be designed by making sensors as servers and the home manager as client. But on the other hand, home manager sends notification to temperature sensor to change the modes between periodic and non periodic. To implement this, the home manager and temperature sensor need to change their roles as server and client respectively which is hard to design.

Furthermore, the home manager publishes a shutdown event notification to which every other process gets subscribed and shuts down after receiving the command. It is easy with publish/subscribe as all other sensor processes have subscribed to the event. But it is very hard to implement with Web Services as there is a tight coupling of the server and the client. It is not possible to send the same message to a group of processes in a multicast fashion, instead a copy of the same message must be sent to each one of the processes.

The RPC can be implemented using the Web Services and is relatively easy compared to event notification. The user interface requests a log of health or temperature and the home manager replies back with the information. This can be implemented making Home Manager as server and the user interface as client.

Also in web services, due to the large message size caused by XML format the latency can become a serious issue. The lack of multicasting also requires the server to store information about all processes (in this case sensors), to contact them if necessary. Also, the client must know the connection point (IP address and port number) of the server before establishing a connection where as in case of event notification all that the processes need to know is the event router address. Plus the server must be running before the client. In our assignment 1, the Home Manager must be up and running prior to the sensors to receive the readings.

Due to all the reasons listed above it would be difficult to implement the SmartHome assignment using Web services.