Alternative Project: only for teams not enrolled in the Integrative Project of the 4th Semester

RCOMP 2022-2023 Project – Sprint 4

1. Shared Board

The final goal of this sprint is implementing a virtual **Shared Board** prototype / proof of concept.

For the sake of this sprint, a Shared Board is table with several lines and columns. Each cell of the Shared Board may store either **a plain text content** or **an image** (not both).

The desired system is made of two network applications to be developed; they will interact with each other by using the **Shared Board Protocol** (SBP) described in Chapter 2. The global look of the system is shown in Figure 1.

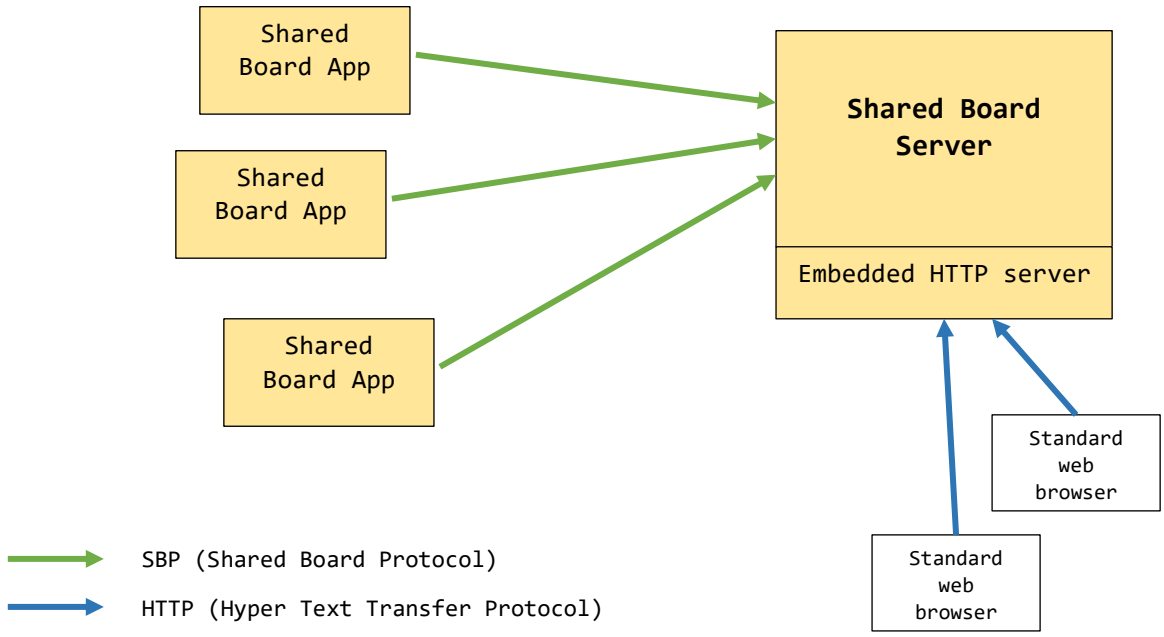

Figure 1- The desired system

1.1. Shared Board App

This is a command line network application that takes the client role of the **Shared Board Protocol** to communicate with the **Shared Board Server**. The main purpose for the **Shared Board App** is managing the Shared Board that exists at the Shared Board Server side, for instance, posting plain text or an image into a cell.

1.2. Shared Board Server

The Shared Board Server maintains a Shared Board (table of cells, each capable of holding text or an image), at this stage of the project all data is to be stored in memory (non-persistent). When the server starts the board has a default size of five lines by five columns, and all cells are empty. By using the Shared Board App, the board may be resized; lines and columns may be added or removed.

Beyond being an application server of the Shared Board Protocol, the Shared Board Server is also an HTTP server. The HTTP server role's purpose is to provide a view-only rendering of the board. The exhibition of the Shared Board at the web browser is required to permanently reflect the current state at the server without the need to reload the HTML page, the use of AJAX is recommended.

During this sprint of the project, no authentication or authorization are required over SBP or HTTP.

2. The Shared Board Protocol (SBP)

The purpose of this application protocol is facilitating data exchanges between the ***Shared Board App*** and the ***Shared Board Server*** network applications.

2.1. SBP description

- Is TCP (Transmission Control Protocol) based, therefore, prior to any actual data exchange, a TCP connection must be established.
- Uses the client-server model. The **client application** (***Shared Board App***) is the one that takes the initiative off requesting a TCP connection establishment with the counterpart **server application** (***Shared Board Server***), which should accept incoming connection requests.
- Once the TCP connection is established, the client-server is no longer mandatory, both the client application and the server application are allowed to take the initiative of sending data, **a request**. The counterpart application must be always available to receive a request, process it, and then send **a response** to the received request.
- Every request (sent by the client or the server) has a mandatory response (correspondingly sent by the server or the client), both requests and responses share a same general message format described ahead.
- Once established, the TCP connection between the client and the server is kept alive and is used for all required data exchanges while the client application is running.

2.2. SBP message format

Every data exchange through the TCP connection (requests and responses) must comply with the bytes sequence description in Table 1, this is the message format version one. This message format is not expected to change during the SBS development in this sprint.

Field	Offset (bytes)	Length (bytes)	Description
VERSION	0	1	SBP message format version. This field is a single byte and should be interpreted as an unsigned integer (0 to 255). The present message format version number is one.
CODE	1	1	This field identifies the type of request or response, it should be interpreted as an unsigned integer (0 to 255).
D_LENGTH_1	2	1	These two fields are used to specify the length in bytes of the DATA field. Both these fields are to be interpreted as unsigned integer numbers (0 to 255). The length of the DATA field is to be calculated as: `D_LENGTH_1 + 256 x D_LENGTH_2` The length of the DATA field may be zero, meaning it does not exist.
D_LENGTH_2	3	1	
DATA	4	-	Contains data to meet the specific needs of the participating applications, the content depends on the message code.

Table 1- SBP message format

2.3. SBP message codes

Table 2 contains a list of some fundamental message codes that must be implemented by every application using SBP.

CODE	Meaning
0	**COMMTEST** – Communications test **request** with no other effect on the counterpart application than the response with a code two message (ACK). This request has no data. Once the Shared Board App connects to the Shared Board Server, it is supposed to send a COMMTEST request.
1	**DISCONN** – End of session **request**. The counterpart application is supposed to respond with a code two message, afterwards both applications are expected to close the session (TCP connection). This request has no data.
2	**ACK** – Generic acknowledgment and success **response** message. Used in response to successful requests. This response contains no data.
3	**ERR** – Error **response** message. Used in response to unsuccessful requests that caused an error. This response message may carry a human readable phrase explaining the error. If used, the phrase explaining is carried in the DATA field as string of ASICII codes, it's not required to be null terminated.

Table 2- SBP message codes

During the project development along sprint 4, teams will establish additional unique message codes as needed to implement the new features. Again, notice that as long as the message format is the same, adding new message codes doesn't change the message format version.

3. Tasks for sprint 4 (Features/User Stories)

3.1. As a user, I want to use the Shared Board App to start a session with the Shared Board Server (this encompasses sending the COMMTEST request) and I want to be able to end the session with the Shared Board Server.

3.2. As a user, I want to watch the Shared Board on my standard web browser, and see any contents changes as they happen.

3.3. As a user, I want to use the Shared Board App to post text or an image into a cell, if the cell is not empty, the previous content is silently replaced. In the case of an image, a file with the content is to be provided to the Shared Board App.

3.4. As a user, I want to use the Shared Board App to copy the content of a cell to another cell, erase the content of a cell and move the content of a cell to another cell.

3.5. As a user, I want to use the Shared Board App to increase/decrease the number of lines or columns of the Shared Board. When reducing the number of lines or columns, the corresponding cells' contents are silently discarded.

For teams with four members, the task number 3.5 is to be ignored.