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Vritual Classroom 4.0 Components and Their Interaction

The Virtual Classroom is organized in many components that are split into two main categories according to a client-server architecture. The server part is in the component named VCServer and uses some functionality from other supporting components such as NameServer. The client side of the software is split into two categories one for students operations and implemented in Student Tool and one for teacher operations implemented in Teacher Tool. Another component that is part of the client side is the SmartUpdate.

Client Side Components:

Student Tool:

The main unit in this component is in the file called Unit_Main.pas and this unit is responsible for the following operations:

- Drawing the different GUI components such as buttons, icons, drop-down lists, panels, etc.
- Minimizing and maximizing the main form of the tool
- Drawing the emoticons of the students and the teacher in the classroom window and all the operations associated with those images
- Action_SendExecute: this method is responsible for sending the chat messages to either all participants in the classroom meeting or to a private person
- connectNS: this method connects the student tool to the name server
- SaveExecute: this method saves the dialogue messages exchanged during the classroom session if the user chooses to do that
- connectVC: connects the student tool to the server side (VCServer and ImageServer)
- DrawBlink: draws a blinking image using the method BlinkImage when an image is changed by the user or the system
- SilentDownloadAll: downloads all the new images from the server after connection and backs up the old images and removes them
- UploadImage: allows the user to upload new images for use instead of the emoticons
- Timer2Timer: this is the heart of the student tool as it is the central routine that selects an action from a set of commands as follows:

- Login: if the command is to login, the student name and password are checked and the login operations are performed
- url: perform operations to send a page using the web browser
- msg, msgPrivate or msgTeacher: send a chat message to all, a private person, or the teacher
- updateImage: update the image of the person according to his or her choice
- push permission: give push permission to students
- image permission manage: set permissions for image manipulation
- indicate whether teacher is online by drawing his icon to indicate so
- update online student list
- meeting: set the session to meeting

Teacher Tool:

The teacher tool is also on the client side of the system and is very similar to the student tool except that the teacher is allowed to do management tasks that students are not allowed to do such as setting the push permissions and the image management permissions, etc.

SmartUpdate:

This component is responsible for updating the software both for the student and teacher tool. Its main module is in Unit_Main.ps.

Server Side Components:

VCServer:

The heart of this component is in MainForm.pas and it is responsible for the following actions:

- Drawing the different user interface components
- Creating and adding clients to the list of active clients when new connections arrive. This is done through the procedure called tcpServerConnect
- Destroying and removing clients from the list when clients log off. This is done through the mirror procedure tcpServerDisconnect
- tcpServerExecute: this procedure is the heart of the server and it switches its actions according to the status of the client:
 - cslogin: if the client is logging in, it verifies the client login information and accepts or denies the login. If the client is accepted, it is added to the tree of clients and is given a list of courses to pick from
 - cstalking: if the client is in the talking status, different operations are expected here such as sending in private or broadcast, etc.
- BroadcastMessage: this procedure is responsible for sending a message to all clients

NameServer:

This component is responsible for handling issues related to databases of usernames, server DNS name, students and teachers, etc. Its main modules are:

- Unit_db.pas:
this module is responsible for communicating with the database that has all the information about students, teachers, courses, etc. It has a number of queries that request usernames, passwords, list of courses registered for/taught, list of students in classroom, etc.
- Unit_Main.pas:
this part is responsible for drawing the UI and its different components

Root directory:

The root directory contains codes that are common for all the different components such as the following:

- Unit_Common.pas: this contains the variables, constants and definitions shared by all components such as the communications protocol message types. It also contains some procedures that are global to all other modules such as Delay, GetIPAddress, etc.
- FmxUtils.pas: this module is responsible for file operations such as copying, moving and executing files
- Unit_DrawingTool.pas: this is responsible for drawing and its associated operations