Powerplan: the alternative software for presentations at local area network using VirtualTreeViewand omnithread

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Article Info	ABSTRACT
	Software development from the results of this research is not only beneficial for educational institutions but also for personal or specific institutions and institutions who want to conduct seminars, presentations, or other activities that involve many audiences. The advantage is that the audience will not experience problems such as when using an LCD projector, such as limited visibility, location or space, and the viewpoint of the audience on the Projectors. This research can be the answer to the need for using LCD projectors that often occur in the process of education, meetings, or seminars that continue to increase every time. Also, the lack of LCD compared to the number of teaching needs in each class and the unstable electricity conditions and the low electricity ratio in East Nusa Tenggara, so that makes the device LCD vulnerable to damage. Testing on LAN networks withthe same number of clients on each test shows that there was an increase of 18% and 75% in each addition to the number of servers. The best performance of Powerplan is still shown when the number of servers that present several five, with the response time of each client connected under two seconds.

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1. INTRODUCTION

The reason why PowerPoint is the most widely used application in the world is that PowerPoint is a powerful tool in making presentations with a clear structure and has a strong visual impact [1]. Microsoft's continued development of PowerPoint also supports this since it was acquired from Forethought in 1987 [2]. Also, another advantage that PowerPoint has is the use of video, audio and hyperlink document functions, where these functions are quite efficient in presenting learning material thus helping influence on student achievement, despite the positive response of students to using PowerPoint [3, 4]. Another advantage of PowerPoint compared to conventional teaching is that PowerPoint can give a positive effect on learning retention over a more extended period [5].

In the field of research, there are around 86% of researchers or most researchers use PowerPoint to present their research results because of the advantages of PowerPoint in reporting to tables and graphs [2]. While in the field of teaching, field offices and research fields where presentations using PowerPoint are combined with projectors [6]. The results show that using PowerPoint makes it possible to tailor their expertise through information exchange and negotiation in conveying information through PowerPoint presentations. The combination of PowerPoint use and projector devices used in teaching and learning and presentation, learning brings significant benefits regarding learning and motivation learning [7, 8].

This research can be the answer to the need for using LCD projectors that often occur in the process of education, meetings, or seminars that continue to increase every time [9, 10]. Also, the lack of LCD compared to the number of teaching needs in each class [11] and the unstable electricity conditions and the low electricity ratio in East Nusa Tenggara [12, 13] have resulted in frequent blackouts suddenly, so that makes the device LCD vulnerable to damage. Plug and play device connections by projectors make the presentation process dependent on the use of the projector quite high. However, problems can arise when there are no or limited available projectors. In addition to the problem of limited availability, there are also other problems, such as blurry, shaded, or dead pixel projector display problems. Also, the Projector has limitations regarding visibility and viewing angle to the projector screen. A projector with a larger resolution is needed if you want to reach an audience with significant visibility. The viewing angle is also quite influential because the viewers on the side with a narrow viewing angle from the screen projector cannot enjoy the projector's display correctly. Another thing that also needs to be seen is the limited presentation space using a projector because the range of projectors is limited to a particular location or room, additional projectors are needed in each room if you have an audience in a different location or room.

The need for LCD projectors is very urgent, so even though they often experience shortcomings, it is impossible to continue to make purchases when needed to repair LCD projectors that require high costs such as buying a new device. Software development from the results of this study is not only beneficial for educational institutions but also for personal or specific institutions and institutions who want to conduct seminars, presentations, or other activities that involve many audiences. The advantage is that the audience will not experience problems such as when using an LCD projector, such as limited visibility, location or space and the viewpoint of the audience on the Projector LCD / Screen. Another contribution that can be given from this research is a model of the teaching and learning process in real-time without using an LCD and only using a PC/ Laptop connected to the same LAN. It is a development of research that supports the concept of green computing because it also reduces the use of equipment LCD projector, but the usage function remains the same even more effective and interactive even without the device. Presentation model like this is the development of new models in the learning process using LAN networks but without using the internet connection and is the cross-platform model.

The results of this study try to provide other alternatives in using PowerPoint to make presentations but without using a projector. There are similar presentation applications that use cloud-based, web-based, or internet connections [14-16]. The applications offered have other advantages, namely without using an internet connection. The proposed alternative software solution is software with the name Powerplan (PowerPoint at LAN) used in the scope of Local Area Networks (LAN) without an Internet connection [17]. Powerplan uses Transport Layer Protocols [18] are TCP and UDP.

2.   RELATED WORKS

Some scientific articles below are an illustration of the use of several presentation devices that are offline, online/ cloud and popular / most widely used types of applications.

2.1. Offline software

Collage is a software made for school teachers in developing countries for teaching needs in class. Collage is another form of practical teaching method in several schools in India, after going through the results of the investigation they believe that with simple equipment can display images and textbooks that can help the process of teaching and learning interactions in the classroom as well as the blackboard used. Four schools in the Indian suburbs tested the use of Collage for presentations in class, and the results showed that in addition to the great interest of the Collage users, the fact that there was an increase in students' learning abilities through visual media was given. Collage working principle is to display a scan of a picture or textbooks through presentations, but more interactive for teachers or users can make a mark on the picture and short writing on Collage media when doing presentations [19].

Applications such as PowerPoint presentations and the like today are commonly used in the world of education. This situation also happens in the education process for students who have visual impairments. Nevertheless, keep in mind that how practical the PowerPoint presentation application is for these students because the teacher only focuses on oral and lecture explanations. In this paper, Onishi et al. [20] are testing software for students who have visual impairments. The results of this software development allow the instructor to distribute information in the form of text and graphics to students who have visual impairments according to their individual needs. Using experimental devices, the results of the tests are the increasing concentration of students regarding listening to the explanation from the teacher.

In Figure 1 we can see all the system components, including management tools for teachers, client devices to display material, and server distribution services that connect management devices and client devices. Server distribution services also distribute material data to management devices on the teaching computer and mark material focus areas and instructions for deleting material data.
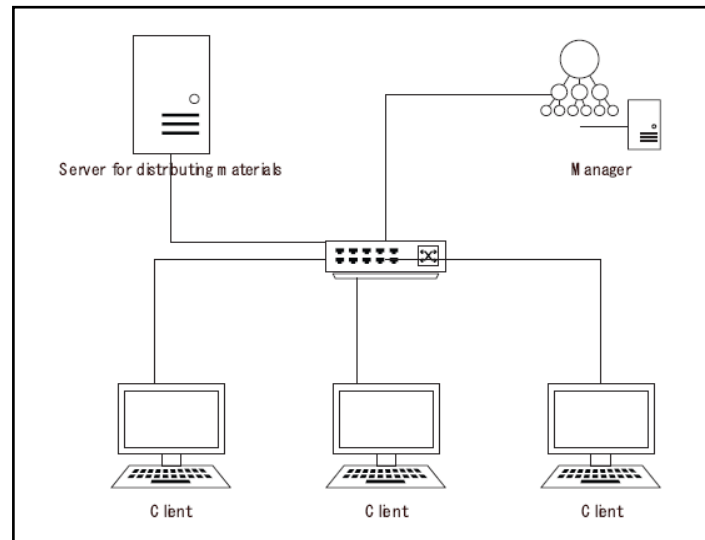

Figure 1. Overview of entire system components [20]

2.2. Online or cloud-based software

The easiest way to make teaching materials consisting of sound recordings and videos are using PowerPoint because it is practical and does not require additional devices. However, now there is a Cloud Computing based system that can provide e-learning content writing system with the name Kumamoto Universal and Multipurpose Authoring (KUMA). The working principle of KUMA are the instructors upload PowerPoint files that have narration to the web application server, and the results will be displayed in PDF slide and video streaming [21, 22]. The working principle of KUMA can be seen in Figure 2. KUMA's work process is to collect PowerPoint material as the initial material for video streaming. The PowerPoint material is processed in a system called Pulsed Power, then published to the Internet in the form of Streaming Book that is ready for use by students. The KUMA work process can be seen in Figure 3.
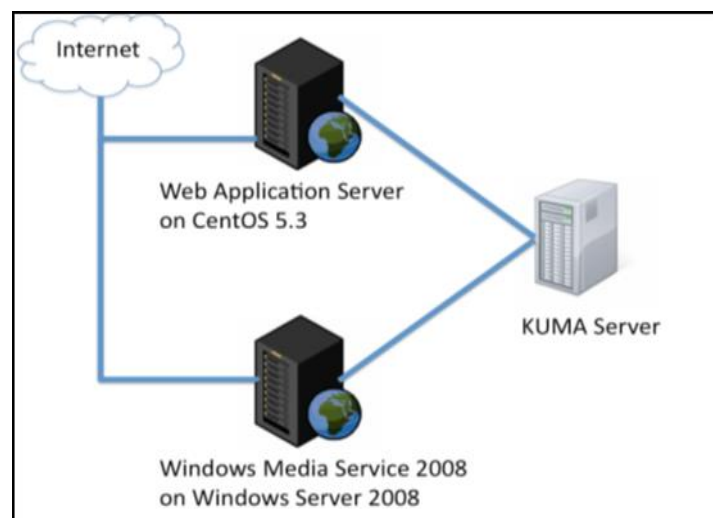

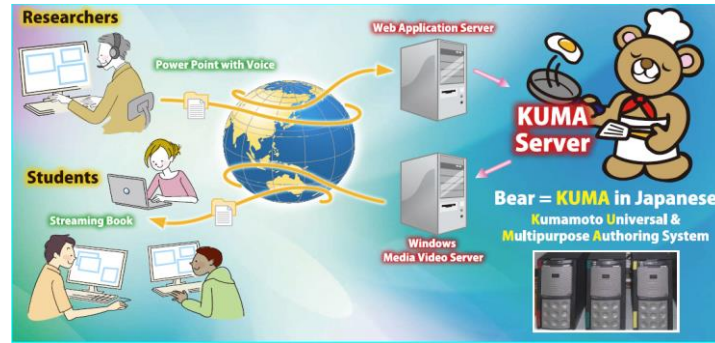Figure 2. KUMA system architectures [21, 22]

Figure 3. Streaming book process using pulsed power engineering [21, 22]

2.3. Popular presentation software

The results of the study [23, 24] provide an overview of the advantages and disadvantages of using PowerPoint and Prezi through questionnaires given to students. However, the results of this study do not compare PowerPoint and Prezi because not many students know and use Prezi compared to PowerPoint so that the results will be less relevant. The following information is a general summary of students' opinions about Prezi and PowerPoint, which can be seen in Table 1.

Table 1. Questionnaires opinion of students [24]

No.	Prezi	PowerPoint
1	- Good; - Free; - Has the function of zooming in and zooming out.	- No Opinion
2	- Interesting; - Nevertheless, do not know how Prezi works.	- No Opinion
3	- Do not use Prezi because it requires an internet connection.	- No Opinion
4	- No Opinion	- Familiar; - Easily accessible; - Many use it.
5	- Low usability value.	- No Opinion
6	- Less support for using plugins for physics, chemistry, and math.	- PowerPoint has functions for physical, chemical and mathematical formulas.
7	- No Opinion	- They are using PowerPoint because they do not know the other presentation programs.
8	- No Opinion	- PowerPoint has fulfilled the presentation needs, so they do not use other applications.

3. PROPOSED SYSTEM

3.1. Work system design

The application consists of two main modules are Client Module and Server Module. As we can see the working principle in Figure 4.
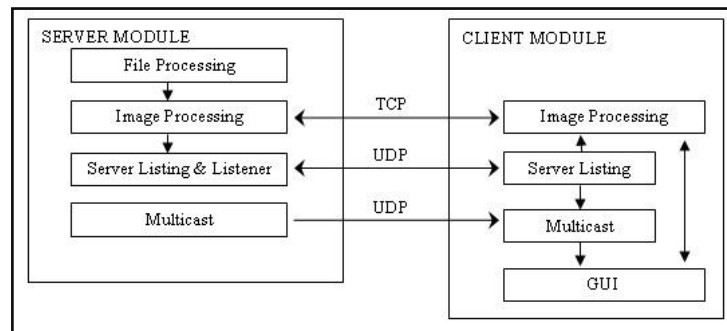

Figure 4. Working principle of powerplan

3.1.1. Server module
On the server module, there are several sub-modules, namely:
a. File Processing Sub Module;
    Responsible for the entire retrieval process Presentation data from the File and saved into the JPEG file format in the temporary directory using the Com Object Microsoft PowerPoint facility.
b. Image Processing Sub Module;
    Responsible for the entire image processing process. The slide begins by taking a slide image that has been processed by the processing sub-module and saved to memory. Besides this, sub-module is responsible also for supplying image data to be transferred to the client at the client's request when the connection is made.
c. Server Listing Sub Module;
    This sub-module has the primary function of registering all presentation servers that are active on the local network. The results of this data collection will be used by the Multicast submodule to decide the name of the multicast group, UDP Port, TCP port and Multicast port that will be used on the presentation server that wants to be activated so that no collision with the presentation server is active on the network.
d. Listener Sub Module;
    The Module is a UDP server that functions to respond to requests from Server Listing Sub Modules on both the server and client to server status, multicast group names, UDP, TCP and Multicast ports used by the server.
e. Multicast Sub Module.
    Responsible for sending information and presentation data to the client during the presentation process.

3.1.2. Client module
In the Client Module there are several sub-modules, namely:
a. Server Listing Sub Module
    Server Listing on the client is the same as the Server Listing sub-module on the Server, where the primary function is to record all presentation servers that are active on the local network. The client will use this list of active servers as a basis for selecting the presentation to be followed. With this facility, the user does not need to manually enter the address and port of the presentation server to be used.
b. Image Processing Sub Module
    Responsible for the entire process of image processing Slide begins by requesting all image slides from the server via the TCP protocol starting from the active slide and then all slides from the smallest index/page.
c. Multicast Sub Module.
    Responsible for listening to all commands from the server to be used as a basis for updating GUI applications.

3.1.3. Working principles
a. Client records active servers on the network by broadcasting the word **server** to the network through the UDP protocol;
b. UDP Server on each server that is active in the network will respond to the request by sending data Title Presentation, Presenter Name, Multicast Group Name, TCP Port, Multicast Port, Number of Slides and Active Index slides;
c. All responses from the active presentation server will be recorded and displayed on the broadcaster list to be chosen by the user;
d. After the user selects which presentation to follow, the client will connect to the server via the TCP protocol to request all available slides with IP Address and TCP Port;
e. The server will send all Slide data in the form of images and indexes (pages to what) in order: the first slide sent is a slide on the current page, followed by all slides that have not been sent, slides starting from the smallest to the most significant pages in the sequence. The process of sending Data Slide using Background Thread;
f. Immediately after the First Slide (Slide on the active page) is received by the Client, Background Thread that handles the Data Slide sending process notifies or informs the GUI to display the Slide on the monitor screen while continuing the process of transferring the other Data Slide;
g. The client activates TIdIPMCastClient Component with Group Multicast and Port data according to the information already obtained in the previous process to respond to (Listening) Multicast Data from the Server;

h. The server sends Multicast Data to all clients by the procedures applied to the server. Multicast Data that is sent is as follows:
   – Slide Index information (Slide number) and Animation Index (Animation Number) which will be displayed when there is an index change on the server;
   – The command to end the presentation session when the server is finished or when the server stops the Presentation process;
i. When the server has finished Presenting or cancelling the presentation, the server will send a command to stop the presentation to all clients connected to the server;
j. The client will end the Listening session, close the Client form and return to the Powerplan Application Main Form, immediately after receiving the command to stop the presentation from the server.

3.2. System compatibility with the operating system

This application is built with the Embarcadero Delphi XE-5 IDE under the Windows 8 Information System so that it can run on almost every Operating System supported by Embarcadero. Prototype Example An existing application is built with the target 32-bit Windows platform so that it can run on all Windows Operating Systems both 32-bit and 64-bit. To produce a more specific Application Prototype following the target Operating System can be done as follows:
a. To produce a specific application of 32 bit or 64 bit on a Windows Operating System, change the target platform on the Project Manager Tab as shown below. The use of project managers in system development is by adjusting the system platform when creating a project group. The process can be seen as shown in Figure 5.
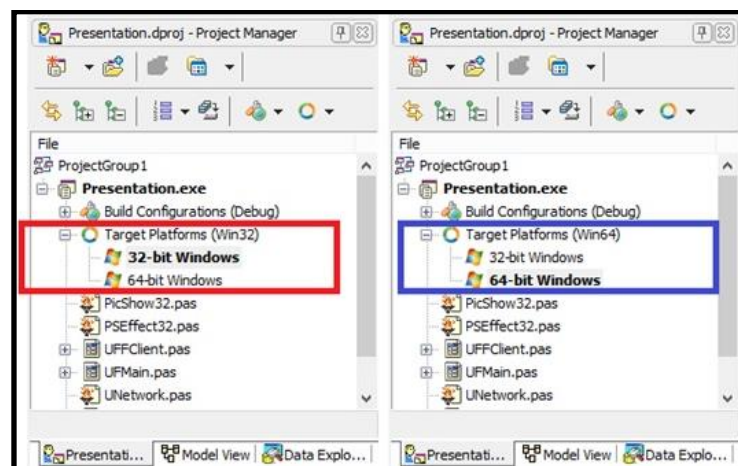

Figure 5. Specific target platforms application type

b. To be able to produce applications that can run on other PC operating systems, for example, Linux and Mac-OS can be selected one of the following two possibilities:
   1) The same source code is used to be built in each operating system with a note; the server must be added with support Presentation files because of the com object and Microsoft PowerPoint as a prerequisite for the proper functioning of the server running only the Windows Operating System.
   2) The target is only added according to Embarcadero support with Com Object's Microsoft PowerPoint must be replaced with an open office library.
c. To be able to produce applications that can run on mobile operating systems such as Windows Mobile, Android, and IOS, the Platform must be changed to the Mobile Operating System. Also, it requires changes to the design of the Graphical User Interface (GUI) according to the target Operating System, and Com Object Microsoft PowerPoint must be replaced with the Open Office Library;
d. Embarcadero support for the Operating System that is targeted by the application platform is different for each version. For example, Embarcadero Delphi XE-5 by default supports 32-bit and 64-bit platforms on Windows Operating Systems but also supports Linux, Mac-OS, Android and IOS operating systems that can be activated during the Embarcadero installation. While in Embarcadero Delphi Berlin/ Tokyo/ Rio, almost all operating systems can be supported as a target application platform, even plugins or components are prepared to add support to other operating systems.

4.   RESULTS AND ANALYSIS

4.1. Implementation system

One of the main advantages of Powerplan application is that the use of the system is not limited to individual rooms. That is, as long as the user is connected to LAN where the server or presenter is located, the user can follow the presentation without having to be present or in the meeting room or the room where the presentation is intended. We can see the initial display or home screen of Powerplan application as shown in Figure 6. The Powerplan application will open the Presentation file and convert it into a format that is suitable for the Powerplan application. The time needed for this conversion process depends on the size of the file size and the number of slides on the file. The conversion results will be displayed as in Figure 7 if the Powerplan application system can read the presentation file.
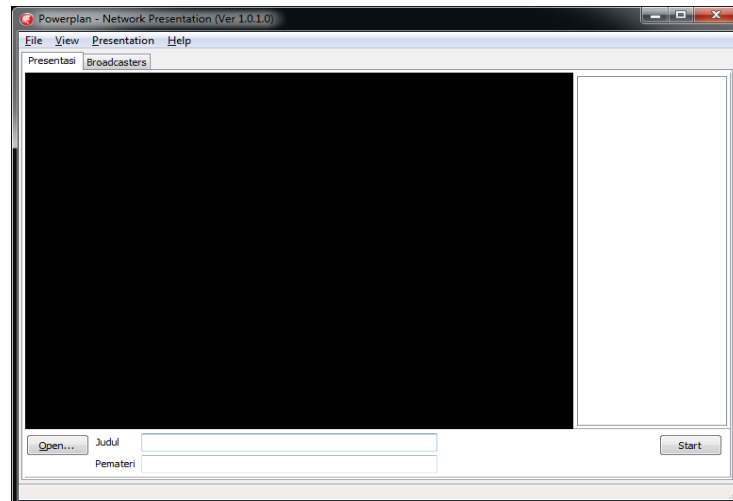

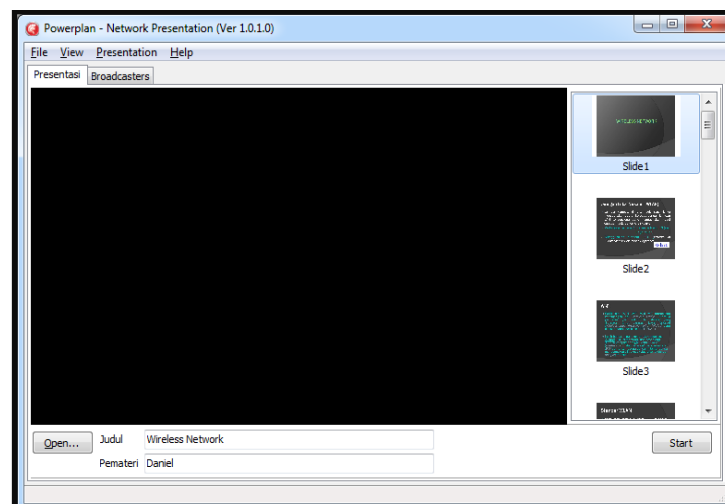Figure 6. Home screen of powerplan application

Figure 7. Converted result by powerplan

After completing the Presentation Title and Presenter Name on the prepared form, then click the **Start** button to start the presentation. The presentation will begin in Fullscreen mode. You can press the **Esc key** to exit Fullscreen mode into navigation mode, and vice versa can click the Preview menu in navigation mode to enter FullScreen mode.

To be able to use Powerplan as a Client mode so that it can follow the presentation, follow these steps:

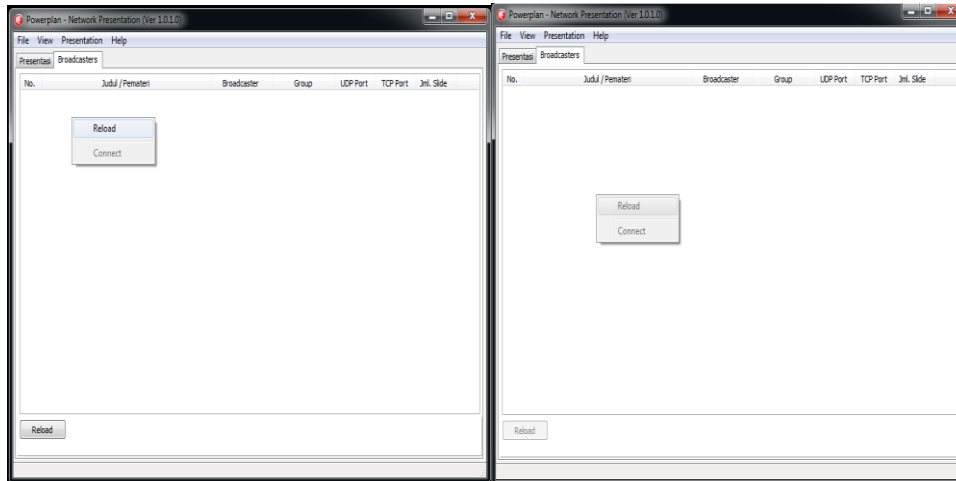−   Run Powerplan, then select the tab Broadcasters as shown in Figure 8;

Figure 8. Powerplan application in client mode

−   Click the Reload button or right-click on the Server List and select the menuReload as shown the following and wait until the search is complete. During the process searching of active Server, the button and menu Reload will be deactivated. If the Reload button is active again, then the searching has finished. The active Server on the network will appear on the Server list;
−   Just right-click on the Server list then select Connect and wait for the Presentation Slide to appear. The connection process, as shown in Figure 9.
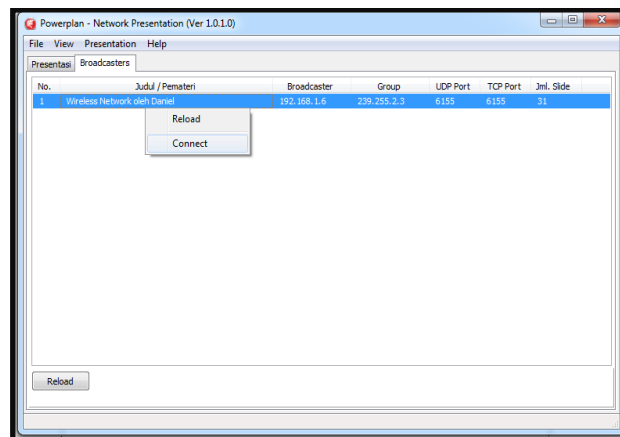

Figure 9. Connection process to the list of server

The development process of Powerplan uses the Embarcadero Delphi XE5 IDE by utilizing "Internet Direct (Indy)" component [25, 26]. In addition to using these Indy components, the Powerplan application also uses third-party components which include VirtualTreeView developed by Mike Lischke [27, 28] and OmniThread developed by Primož Gabrijelčič [29, 30]. The Indy components used in the Powerplan application are :
1. Indy Components in Server Modules;
    −   TIdUDPServer: Serves to respond to the search for Active Servers from the Client;
    −   TIdTCPServer: Serves to transfer presentation data to the Client after the Client is connected to the presentation;
    −   TIdIPMCastServer: Works as Multicaster presentation files;
    −   TIdUDPClient: Serves to record all UDP Ports that have been used by the active server to prevent Port Collision, which is where two or more servers use the same multicast and port groups.

2. Indy Components in Client Modules;
    – TIdUDPClient: Serves to record all active servers so users can choose to follow available slide presentations, without having to input additional information such as Host Name or IP Address and Port;
    – TIdTCPClient: Serves to transfer presentation slide data from the server after the client is connected to the presentation;
    – TIdIPMCastClient: Serves to receive and process data and information sent by the server.
3. Indy Complementary Components on Powerplan.
    – TIdAntiFreeze: Works to prevent application freezes.

4.2. Procedure and function list broadcasting of powerplan system
4.2.1. Procedure list broadcasting

```
procedure _ListBroadcastings(Task:IOmniTask; OnItem:TStrProcRef; UDPPort:Word;
AWaitMSec:Integer);
var
 UDP:TIdUDPClient;
 peerIP, s:String;
 PeerPort:word;
 L:Tstringlist;
 stoped:boolean;
begin
 UDP:=TIdUDPClient.Create(nil);
 L:=Tstringlist.Create;
 try
  UDP.Port:=UDPPort;
  UDP.BroadcastEnabled:=true;
  UDP.Broadcast('SERVER',UDPPort);
  stoped:=false;
  while not (stoped or Task.Stopped or Task.Terminated) do begin
   s:=UDP.ReceiveString(peerIP, PeerPort,5000);
   stoped:=s='';
   if not (stoped or Task.Stopped or Task.Terminated) then begin
    L.Text:=s;
    L.VStr['PeerIP']:=peerIP;
    L.VInt['PeerPort']:=PeerPort;
    TThread.Synchronize(nil,
    procedure
    begin
     OnItem(L.Text)
    end);
   end;
  end;
 finally
  L.Free;
  UDP.Free;
  if not (stoped or Task.Stopped or Task.Terminated) then
  Task.Invoke(
    procedure
    begin
     OnItem('')
    end);
 end;
end;
```

4.2.2. Function list broadcasting

```
function ListBroadcastings(OnItem:TStrProcRef; OnTerminated:TOmniOnTerminatedFunction=nil;
 UDPPort:Word=8889; AWaitMSec:Integer=5000):IOmniTaskControl;
begin
 result:=CreateTask(
```

```
 procedure(const task: IOmniTask)
 begin
   _ListBroadcastings(Task,OnItem,UDPPort,AWaitMSec);
 end, 'List Broadcast')
.OnMessage(
  procedure(const task: IOmniTaskControl; const msg: TOmniMessage)
  begin
    case MSG.MsgID of
      1:OnItem(Msg.MsgData.AsString);
      2:OnItem('NULL');
    end;
  end)
.OnTerminated(onTerminated)
.Run;
end;
```

Applications Powerplan does not handle itself access to presentation files but uses Com Object to access files of the presentation with Microsoft Office applications. Working principles of Server are:
1. The Powerplan application requests the reading of presentation files to Microsoft Office (PowerPoint) using Com Object;
2. If the file can be accessed and read, the Powerplan application will ask Microsoft Office (PowerPoint) to extract each Slide page into JPG / JPEG format images;
3. The extracted page is stored sequentially as a slide in the form of Graph data (images) to be then used to be displayed on the client computer screen or sent to each client when connected.

4.3. Strengths and weaknesses of system
4.3.1. Strengths
a. Simple, no particular server is needed. This application can function as a server, can function as a client.
b. For monitoring purposes, this application can run at the same time as a client and server with a note :
    − The Operating System supports the reuse of the network address by the socket. In this case, the Operating System must support the SO_REUSEADDR option when the **setsockopt** function is called [31, 32].
    − If the REUSEADDR option is not supported by the operating system, the client can only run if the Group Multicast, UDP Port and TCP Port on the client are not the same as Group Multicast, UDP Port and TCP Port on the server running on the same machine / PC.
    We tested the REUSEADDR function to find out the operating system support for the placement of server and client applications on the same PC or different PCs. Test indicators are Multicast Group, TCP Port and UDP Port. The test results are as shown in Table 2.
    − The network is not flooded with broadcast data because the server only broadcasts as needed. Thus there is no limit on how many servers are allowed to broadcast simultaneously in the same network.

4.3.2. Weaknesses
a. Files Supported presentations are PowerPoint files using com objects. It means the Server not only can read PowerPoint files but also only run if the Operating System havePowerPoint;
b. There is no support for open office;
c. Application characteristics are "Still Slide" where the information sent is slide images without support for animation, sound, and video or other media files. The animations found in the Application Prototype are only randomly selected randomly by the server of the animation library developed by developers based on the PicShow library version 4.20 by Kambiz R. Khojasteh[33, 34]. However, keep in mind that still slides also have their advantages because they do not cause flood packets on the network, thus preventing the possibility of bottlenecks. If real-time is required, the broadcast sub-module on the server module must be replaced with real-time online streaming, in the form of a streaming video (audiovisual) in real-time;
d. Relatively Real-Time. It means that it can be said to be Real-Time but not completely real-time because what is broadcast is a command, not a video or image of everything that happens on the server monitor screen. For example, if there is a movement of the cursor on the monitor server/broadcaster screen, the information can only be obtained by the client if the server sends specific information about the movement of the cursor.

Table 2. Reuse address option

PC 01			
Support SO_REUSEADDR			

Experiment 1: Self Presentation			
(follow the presentation from the server on the same machine or PC)			
	Server	Client	Status
Multicast Group	239.255.2.3	239.255.2.3	*OK*
UDP Port	8889	8889	*OK*
Multicast Port	6155	6155	*OK*
TCP Port	6155	6155	*OK*

Experiment 2: Attend Presentation			
(follow the presentation from the server on different machine or PC)			
	Server	Client	Status
Multicast Group	239.255.2.3	239.255.255.1	*OK*
UDP Port	8889	9999	*OK*
Multicast Port	6155	6160	*OK*
TCP Port	6155	6160	*OK*

PC 02			
Unsupport SO_REUSEADDR			

Experiment 3: Self Presentation			
(follow the presentation from the server on the same machine or PC)			
	Server	Client	Status
Multicast Group	239.255.2.3	239.255.2.3	*OK*
UDP Port	8889	8889	*failed*
Multicast Port	6155	6155	*failed*
TCP Port	6155	6155	*failed*

Experiment 4: Attend Presentation			
(follow the presentation from the server on different machine or PC)			
	Server	Client	Status
Multicast Group	239.255.2.3	239.255.255.1	*OK*
UDP Port	8889	9999	*OK*
Multicast Port	6155	6160	*OK*
TCP Port	6155	6160	*OK*

4.4. Proposed algorithm

The algorithm described it is a function to start the connection from the client to the server, which is the condition where the client starts joining the server that broadcasts the presentation.

a. TFClient Create Application;
b. F.fServerData start assign
c. Connection F.fUserName
d. Broadcaster makes CellText for PresentationTitle and PeerIP;
e. Prepare Multicast;
f. ServerData answer and send Presentation Title, Multicast Group, and Multicast Port;
g. Prepare TCP port and Multicast use TCP Port in ServerData;
h. If the result then begins F.Show.

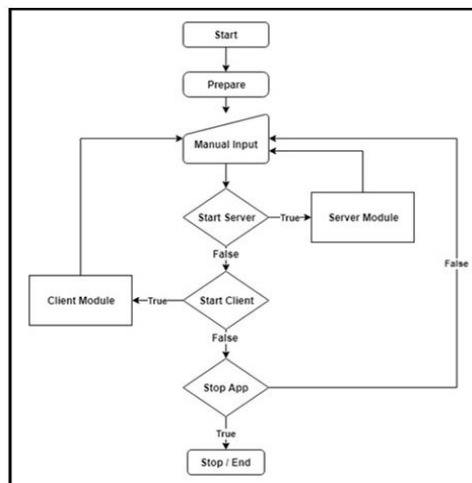We can see the proposed algorithm model in the flowchart chart in Figure 10.

Figure 10. Flowchart of powerplan

Powerplan : the alternative software for presentations at local area network using… (Daniel Silli Bataona)

4.4. Performance evaluation

Below this will be given the results of Powerplan testing and analysis that is run on a Local Area Network, using a scenario that is, Testing on a LAN with one server, two servers, and three servers. Each test uses five DHCP clients with a packet size of data sent by 8 bytes; the client specifications used are the Windows 10 64-bit home edition operating system with 2GB of RAM. As we can see, the first test in Table 3. The Round Trip Times (RTT) test results from five clients deliver an average time of 3.6 milliseconds. In the second test, we can see in Table 4, the number of broadcaster servers plus one. The test results showed that there was an increase in average RTT of 10.4 milliseconds.

Table 3. Test with one server

Name of Presentation File	Number of Slides	Server Broadcaster	Group	Client IP Address	Average Round Trip Times (ms)
Learning01	16	192.168.1.8	239.255.2.3	192.168.1.4	2
Learning01	16	192.168.1.8	239.255.2.3	192.168.1.7	2
Learning01	16	192.168.1.8	239.255.2.3	192.168.1.110	5
Learning01	16	192.168.1.8	239.255.2.3	192.168.1.11	2
Learning01	16	192.168.1.8	239.255.2.3	192.168.1.3	7
Averages Round Trip Times					3.6

Table 4. Test with two servers

Name of Presentation File	Number of Slides	Server Broadcaster	Group	Client IP Address	Average Round Trip Times (ms)
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13	239.255.2.3	192.168.1.4	2
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13	239.255.2.3	192.168.1.7	4
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13	239.255.2.3	192.168.1.110	27
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13	239.255.2.3	192.168.1.11	4
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13	239.255.2.3	192.168.1.3	15
Averages Round Trip Times					10.4

Then in Table 5, testing uses three broadcaster servers but with fewer presentation slides. The third test result showed that there was an increase in the average RTT value from 10.4 milliseconds, to 18.2 milliseconds. This test intends to illustrate that if there are network constraints when implementing Powerplan in a LAN with several broadcaster servers, which causes an increase in the amount of traffic.

Table 5. Test with three servers

Name of Presentation File	Number of Slides	Server Broadcaster	Group	Client IP Address	Average Round Trip Times (ms)
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13			
Learning03	4	192.168.1.19	239.255.2.3	192.168.1.4	14
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13			
Learning03	4	192.168.1.19	239.255.2.3	192.168.1.7	3
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13			
Learning03	4	192.168.1.19	239.255.2.3	192.168.1.110	23
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13			
Learning03	4	192.168.1.19	239.255.2.3	192.168.1.11	10
Learning01	16	192.168.1.8			
Learning02	6	192.168.1.13			
Learning03	4	192.168.1.19	239.255.2.3	192.168.1.3	41
Averages Round Trip Times					18.2

The results of the performance testing showed that there was an increase in the number of RTT averages as the number of broadcaster servers increased. These results can be seen in Figure 11, which shows that the increase influences the increase in RTT in the amount of traffic on the network. This test by adding the number of broadcaster servers that broadcast at the same time, so that all clients can see the list of active servers totalling three servers. The client can select the list of servers that are currently active according to the desired topic or theme. The results test of the Powerplan illustrates that as the number of servers that broadcast increases, traffic increases, and impacts on increasing RTT. However, this has not affected the process of accessing slide presentations presented from each active server. Performance result of Powerplan is right; this is indicated by the average waiting time of each client to get a slide show on the monitor screen of each client is one to two seconds.
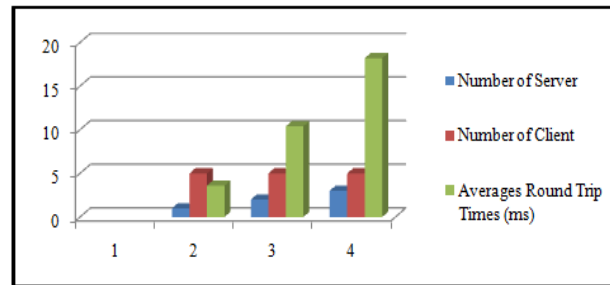

Figure 11. Averages round trip times of performance

5. CONCLUSION

Powerplan system does not broadcast video presentations or broadcast picture frames at any time. Powerplan application only broadcasts commands and broadcast commands carried out only in the event of a change to the server. In this way, reducing the occurrence of collisions on the network by the number of data packages or condition of load balancing [35]; Powerplan application allows the Client and Server modules to run simultaneously on one machine, but this depends entirely on the Authority provided by the Operating System used; Powerplan system can be used on LAN without an internet connection. Powerplan application uses Microsoft PowerPoint files as a presentation base but has the following limitations:

− Server functions can only be implemented if the Server has Microsoft Office installed because the application uses COM facilities to access Presentation files;
− Client and Server functions can only run if the Operating System used is not installed VirtualBox applications or other similar applications, because the application blocks broadcast and multicast data through UDP. To be able to use the Powerplan Application together with VirtualBox without problems, it is necessary to set up the VirtualBox Network Adapter;
− Powerplan application has a Client-Server module in which the application functions not only as a Server that does the presentation but also function as a Client or presentation participant;

The test results showed an increase in RTT along with the increasing number of servers conducting presentation activities. Testing on LAN networks with the same number of clients on each test shows that there was an increase of 18% and 75% in each addition to the number of servers. The best performance of Powerplan is still shown when the number of servers that present several five, with the response time of each client connected under two seconds.

6. FUTURE WORKS

The Powerplan system does not have a chat function between clients and servers, so in its development, the chat function needs to be added. In addition to the Delphi IDE, there are other Compilers, namely Java, which has more and more extensive support because there are almost all libraries for Presentation and streaming. So that in the development of Powerplan will be created using Java.

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