# Design Architecture for IMPlayer as a Tool for Supporting Visual Education Presentation

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**Abstract.** Presentation of teaching-learning materials in various visual media forms is immensely necessary and important for educators and students in visual education. Most often these materials which include videos, audios, and images exist in numerous file formats indicating the needs for different types of multimedia applications to run them. Thus, utilizing various combinations of many file formats during a presentation implies the needs to have the necessary media players and be familiar with all of them. This can be very awkward for a presenter especially when switching between players during a presentation. In this paper, an integrated player (IMPlayer) which allows user to run multiple media in a single application is proposed as a solution. Basically, the application provides an interface that allows easy access to various players. The design architecture which supports multiplayer mode and dual-view features is presented. Example uses of the tool to support visual education presentation are also described.

**Keywords:** visual education, IMPlayer, Dualview, Multimedia Application, Multimedia Player, Multimedia Presentation.

## 1 Introduction

The visual education has been studied and utilized since World War I and II period. After using of training films and other visual aids during World War II, audiovisual technology gradually developed in sophistication and its use became more widespread in educational establishments [1]. Currently visual education is emerging as a field of education driven by changing practice, contemporary society and technology. Since the educational field is emergent, the nature of visual education is powerfully revealed by attending to the practices, thoughts and ideas [2].

On the other hand, technology provides exciting opportunities for enriching and transforming visual arts teaching, providing educators and students with new tools to access, organize and present information and to enrich lessons through multimedia [3]. The educators and students need specific knowledge for presenting the material of teaching-learning in visual media forms [4]. Visual media forms means the materials must be transformed from such as the simplest hand-drawn chart to video,

Powerpoint© and website presentations. Powerpoint©, as a slide-based presentation, may contain texts, images, graphics and moreover videos materials to make up the presentation. But it implies that its file size will be bigger and need more time to process it [4]. Therefore it is better to separate between powerpoint© file and video files.  Hence, in the presentation of visual education the educators and students need some tools to present or to play various visual media forms such as multimedia player applications.

Currently there are many types of multimedia player applications available. Commonly in visual education the educators and students use a different multimedia player to present a different multimedia file type. For instances, when they want to present various multimedia file formats such as for presenting flv, movie in DVD format, SWF, MP4, and VCD or audio in MP3 file they prefer use flv player, DVD player, flash player, MP4 player, Windows Media Player© respectively. For displaying images file they use image viewer such as ACDsee©. Moreover for special task such as video capturing and voice recording, they usually use a special application program.

Indeed this is not a flexible and ineffective presentation task for presenters. They need to present various multimedia file types within a session. They need several players, live video applications and power point© to do the task.  Consequently, they need to have experience in various multimedia player applications and it's a high possibility that the teachers would be in confusion in the middle of their presentation.

A design architecture was created to develop an Integrated Multimedia Player (shorted as IMPlayer) to solve those problems. By studying and performing relevant experiments it can prove that IMPlayer can support visual education presentation in flexible ways. IMPlayer is a new concept of multimedia player application that integrates the presentation of multimedia file types (video, audio, animation and e-presentation files). IMPlayer can be operated as video/audio player, image viewer and animation player such as VCD player, DVD player, flv player, mp3 player, jpeg/bmp/gif viewer, and flash player. Also the IMPlayer has ability to utilize dualview feature so the view of IMPlayer's control panel and its output screen is separated into two different monitor [5].

This paper is organized as follow: section one is introduction, and then section 2 is literature review, section 3 describes the system architecture of IMPlayer, section 4 explain the operation modes of IMPlayer for supporting visual education presentation, section 5 the Discussion, and  the last section is the conclusion.

## 2   Literature Review

### 2.1 Visual Education

The visual education in its broadest sense includes all learning involved which seeing [6]. From [1] visual education is defined as instruction where particular attention is paid to the audio and visual presentation of the material with the goal of improving comprehension and retention. The equipment used for audiovisual presentations are: dioramas, magic lanterns, planetarium, film projectors, slide projectors, opaque projectors (episcopes and epidiascopes), overhead projectors, tape recorders,

television, video, camcorders, video projectors, interactive whiteboards, and digital video clips [1].

According to [4], visual education should be proposed as a field of education. The Review of Visual Education's research team has identified four essential attributes of effective Visual Education. These are:

1. Studio-based experience: hands on, embodied practical and cognitive learning through students actively engaging in processes of expressing and communicating visual ideas, applying skills, techniques, processes, conventions and technologies, exploring creativity and innovation for real or authentic audiences and purposes;
2. Working with materials: expressing and communicating ideas with authenticity and exploring creativity and innovation through physically working with a range of materials;
3. Relationships of trust: students and teachers as active co-constructors of learning, promoters of communities of inquiry, working with trust in studio-based mentor/learner relationships;
4. Applied aesthetic understanding: the dynamic individual relationship that each student develops with the arts through active processes of engagement at the intersections of three dimensions:
   a. what they already know, understand, value and can do in visual expression and communication;
   b. their own past experiences of the arts of their own and other times, their own and other cultures and places;
   c. The potential of all experiences and materials available to them.

Over the past 70 - 80 years visual education has had four distinct phases. In the case of the first three, each new phase was in some way a reaction to the one that preceded it. In the case of the fourth, however, the phase has both to look forwards and backwards, to be proactive and not simply reactive to the past; as yet this phase scarcely has defined features [7].

Meanwhile, the goal of visual education is to help students acquire visual reception, cognition and communication, demonstrate devices of visual expression and improve students' vision [8].

There are a number of important factors that contribute to the success of the visual arts education programs. This include the dedication and commitment of the highly skilled and energetic staff, passionate about sharing their enthusiasm with the students. They are recruited to some extent based on their specialist knowledge and skills within the visual arts. For example, there is specialist support for a variety of media including painting, ceramics, photography, video art, graphic design, sculpture, animation, printmaking and textiles [7].

## 2.2   Multimedia Player Review

Media player is a term typically used to describe computer software for playing back multimedia files. Most software media players support an array of media formats, including both audio and video files. Some media players focus only on audio or video and are known as audio players and video players respectively.

Many media players use libraries. The library is designed to help user organize or catalog the music into categories such as genre, year, rating or other. Good examples of media players that include media libraries are Winamp, Windows Media Player, iTunes, RealPlayer, Amarok and ALLPlayer.

Media Player Classic with media codec provides more services to accommodate more video/audio file types such as flv and mp4. This player has not provided a service to control live streaming video and has not utilized the extended desktop feature [14]. AllPlayer supports and accommodate almost all file types of multimedia: audio, video, image, live video streaming [15]. But this player still has not provided a special service to utilize the extended desktop feature and not support flash files.  Beside it the player also has no feature to record a voice or video capturing.

### 2.3  Extended-Desktop Feature in Windows

Extended desktop feature (or also called as dualview feature) is a standard feature in modern laptop that enable the user to extend the computer's desktop twice of its length, so the computer seemly have two monitor separately [9].

One of the important function of the dualview is its performance to make a difference between LCD projector display and laptop display [9][10]. The LCD display (secondary monitor) can be set as only for screen display from the output of multimedia player and the desktop view or other windows process display are in primary monitor [11]. This can get a benefit, the presenter's private information such as the files and folder list view and any other desktop processing view can be guarded from audience. So this case can improve the convenience and interest of the audience or student [12],[13].

## 3   The Architecture of IMPlayer

The proposed integrated multimedia player (IMPlayer) presents some solutions to the weakness of today's available multimedia player applications. IMPlayer support almost all video file types and audio file types with the codec already installed before. The IMPlayer can support flash animation (swf), live video streaming and power point files.

### 3.1  Single Compact Control Panel UI

The IMPlayer uses single compact control panel as its GUI. Shown in Figure 1, all multimedia elements are arranged and controlled in one main window. The IM-Player's control panel has three tab-pages Main, Flash and Live.  The tab-page Main contains three file lists.  From left to right, filelist-1 is a list of selected audio video files, filelist-2 is list of selected image files and filelist-3 is list of ppt files. The tab-page Flash contains one file list for take in Flash© animation files (swf). The tab-page Live contains some menu for controlling the live video streaming.

Some terminologies used by IMPlayer are:
   a.  *Primary monitor device*: the main monitor of computer that has dual-display feature (usually laptop). It is to display window's desktop, window's application program, and also as main area to show the single-compact control panel of IMPlayer.
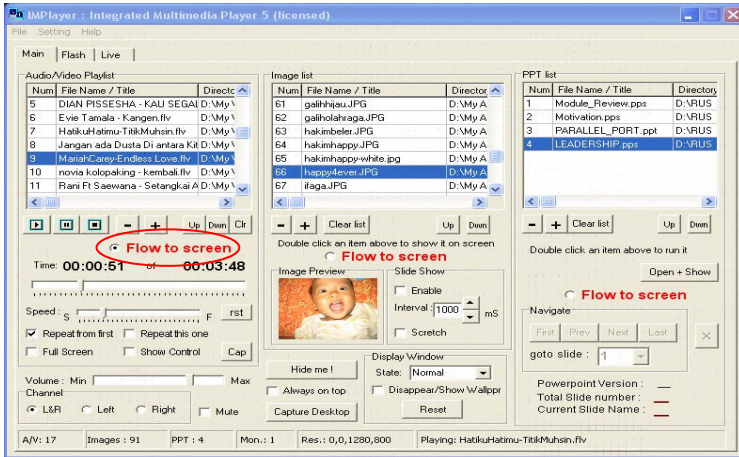
**Fig. 1.** IMPlayer's user interface

b.  *Secondary monitor devices*: it represents a monitor device, TV device, or LCD projector. Secondary monitor is specifically used to display the output of IMPlayer.

c.  *Multimedia stream*: is the output from multimedia elements processing. There have five groups of multimedia elements, so there are five streams of multimedia: audio/video stream, image stream, powerpoint stream, flash animation stream and live video stream. A multimedia stream would be displayed to secondary monitor via particular channel.

d.  *Channel*: a channel is an "abstract path" for particular multimedia stream. Since there are five multimedia streams so at least five channels are needed.

## 3.2   The Design Architecture

The overall design architecture of the IMPlayer is depicted in Figure 2. The straight line arrows represent the direction for controlling, managing and or handling any processes. The dashed line arrows describe the direction of the multimedia streams.

Audio controlling routine will control the audio/video file list. If the user selects an audio file in the file list, the system will find the chosen file in particular storage. When the file is read and successfully processed into voice stream then rely the stream to audio/video channel that directly output by sound card. For video controlling routine, when the user select a video file in the file list, the system will read and process the selected file become video and audio streams. Both streams occupy the audio/video channel. The video stream will be output by video adapter into secondary monitor and the audio stream will be output by soundcard.

In the same way, the image controller routine, flash controller routine and PPT controller routine will control the associate file list. When a file in the file list is selected, the system will read and process it to become a particular multimedia stream. If this process is succeeded the multimedia stream will be directed into appropriate channel. Here a channel controller algorithm is used to control which one of the channels is allowed to rely its multimedia stream into secondary monitor.
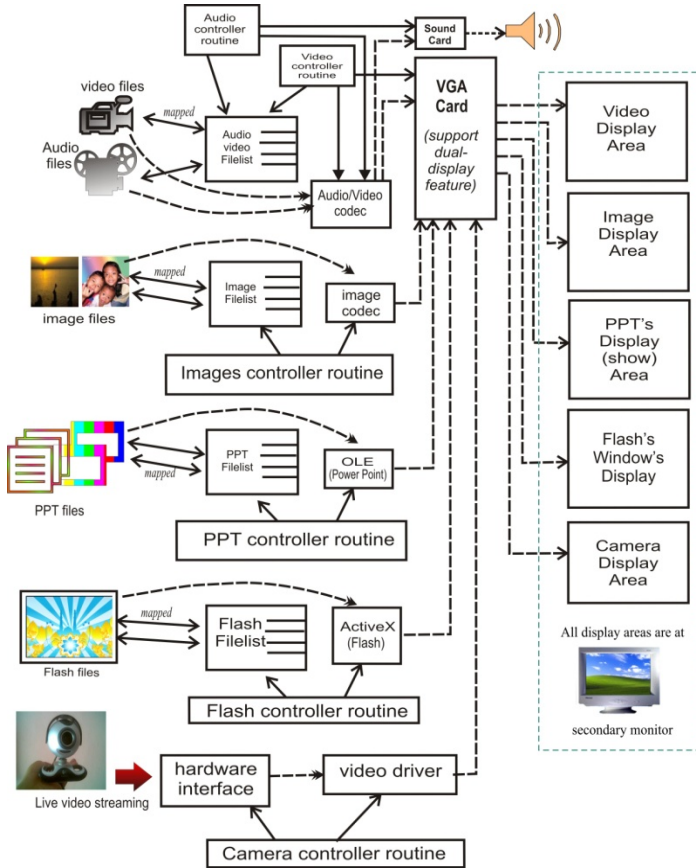
**Fig. 2.** The design architecture of IMPlayer

The camera controller routine is rather different from other controller. It does not need file list because it directly controls a hardware device such as webcams, CCTVs or others. The Camera controller routine will control the camera properties and features, for examples choosing the appropriate device driver, start or stop preview, start or stop recording, even controlling the display window in secondary monitor.

## 4   The Operation Modes of IMPlayer for Supporting Visual Education Presentation

As described in section 3, the IMPlayer is to be operated as some mode of multimedia player. In additional, the IMPlayer's user interface offers a flexible way to change among multimedia player types. Therefore this player was proposed as a tool to support some presentation in visual education.

### 4.1   As Audio/Video Player

In visual education, students and teachers need to use and present some video file types. Today they can easily obtain the video material for visual education, such as download the materials from Youtube, or buy it from online store, or custom made.



(a).
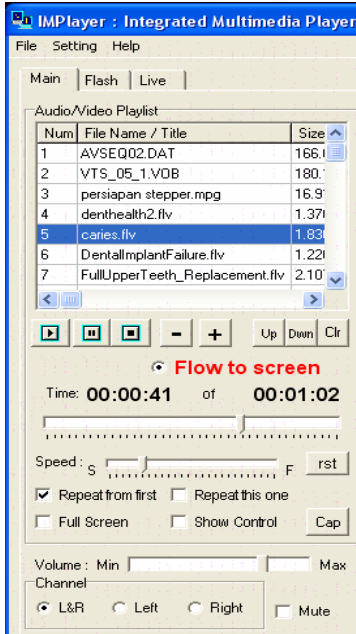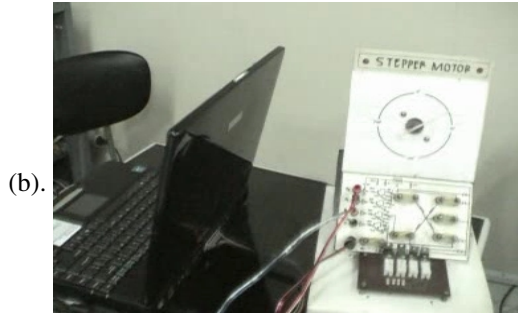
**Fig. 3.** (a). IMPlayer is set as video/audio player (b). A screenshot while IMPlayer is playing a movie file (c). The screenshot while IMPlayer is playing a flv file.

Youtube is the most popular video resource site that provides many materials for visual education in many areas. The video files from youtube are stored in flv and mp4 file format. In order to play the files the user must have flv or mp4 player. So, the common video files that used by students and teachers are VCD, DVD, avi, and flv.

To set the IMPlayer as Audio/video player only activate the radio button "Flow to screen" under the audio/video filelist. See figure 1 and 3, since the users usually do not play the audio and video file at the same time so the selected audio files and video files are placed into one list. The view of filelist-1 is in primary monitor (Figure 3.(a)). Figure 3(b) depicts the screenshot while playing movie file about PC based interfacing class, in file list is the 3rd file number. Figure 3(c) the screenshot of playing flv file about dental health education, in the file list is the 4th file number. Both fig 3(b) and 3(c) are in secondary monitor.

In this mode, IMPlayer can play many common video and audio files, such as: DVD, VCD, mpeg, mp4, avi, flv, mp3, wav, mid, and wma files (Figure 3.a). If a video file is playing, the video output will occupy the secondary monitor in full screen (Figure 3.b and 3.c) and the audio part output by soundcard (active speaker). And if

an audio file is playing, the secondary monitor is in blank with logo. Nevertheless the user can view an image to fulfill the blank screen. At this state the IMPlayer is in multimode player i.e. mp3 player and image viewer.

## 4.2 As Image Viewer

Picture, image or graphic are other multimedia elements that is important in visual education. By using a camera, a moment in real event can be captured and then stored as a specific image file format in storage device. Then, it becomes materials to support visual education. For an example Figure 4(a) and (b) depict an image about total lunar eclipse. This image can help a teacher to explain about solar eclipse and help the students to understand this knowledge easily and clearly.
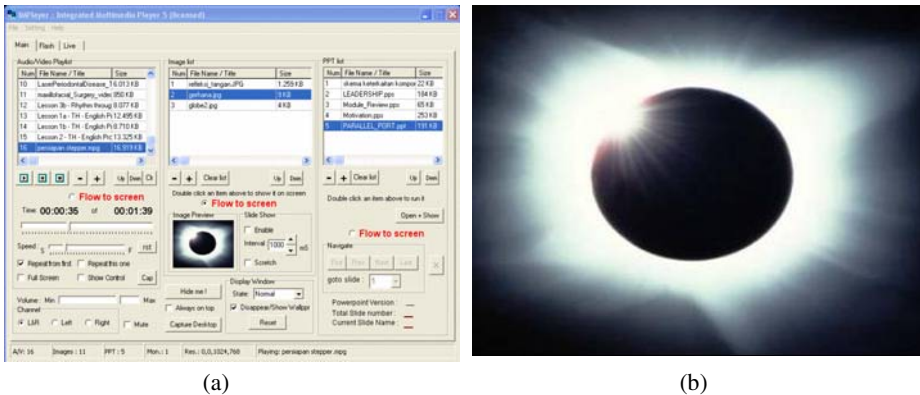


(a)                                                              (b)

**Fig. 4.** (a). The views of image preview in primary monitor (b). The view of solar eclipse picture in secondary monitor

To set the IMPlayer as an image viewer it only needs to activate the radio button *"Flow to screen"* under the image filelist (This is shown in Figure 4(a)). The image file types that can be shown are bmp, jpg, and gif. There is a feature to show a sequence of images, as image slides. An image preview is used by the user to watch the appearance of the image file in secondary monitor. This mode is the default mode of IMPlayer when start running, so the image that shown on secondary monitor is like a background or wallpaper of secondary monitor.

## 4.3 As ppt Viewer

This is an additional mode of IMPlayer to make it more flexible to used in educational environments. Setting up the IMPlayer in this mode is by activating the radio button *"Flow to screen"* under the ppt file list. To open and show a ppt file, double click the file or select the file and then click *"Open +Show"* button.

The view of power point is in primary monitor and the show area is in secondary monitor. Presenter uses the power point application to control his or her slides.
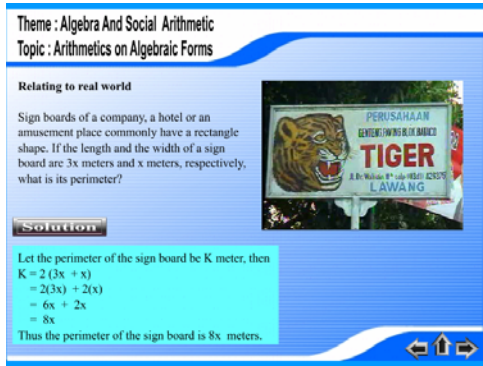
### 4.4  As Flash Player

As known, the Flash© animation can be med to perform interactive visual education. Figure 5 depicts screenshots while playing a Flash© animation file (swf) on Algebra and Social Arithmetic subjects.

To set the IMplayer as a Flash© player, first enter into *tabpage Flash*, then click the play button and activate the radio button *"Flow to screen"* under the file list. The running of a swf file can be controlled by particular menus in the Flash tabpage.
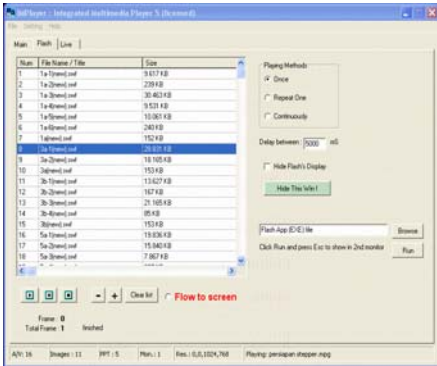


(a)                                                    (b)

**Fig. 5.** IMPlayer is operated as Flash player  (a). The views of Flash player in primary monitor (b). The view of secondary monitor

### 4.5  As Live Video Previewer and Capturer

The menu controllers of this mode are in tab-page 3 [Live], (see Figure 1). User can select video previewer or capturer. The video previewer is only preview the streaming video without any capturing task. But the video capturer can capture a part or full of the streaming video.

The view of live video streaming can be combined with the view of one of video, image or flash player in secondary monitor. Figure 6 is an example of IMPlayer that used in dentistry area. Assume a lecture in dentistry course teaching about the damage process of a tooth. Figure 6(b) is a screenshot of the live video streaming from a camera in shooting and previewing an array of damage teeth. Figure 6(c) shows live video streaming which combined with Flash© video files (flv) about how carries happen into the teeth that finally create cavities. The educator uses to utility depicted in Figure 6(c) to improve the students' understanding about this subject in visual mode.

IMPlayer can change from one operation mode to the others very easily by activating the radio button under the related file list. IMPlayer can also be operated as more than one mode (multimode player) and only one output mode can be shown in secondary monitor.
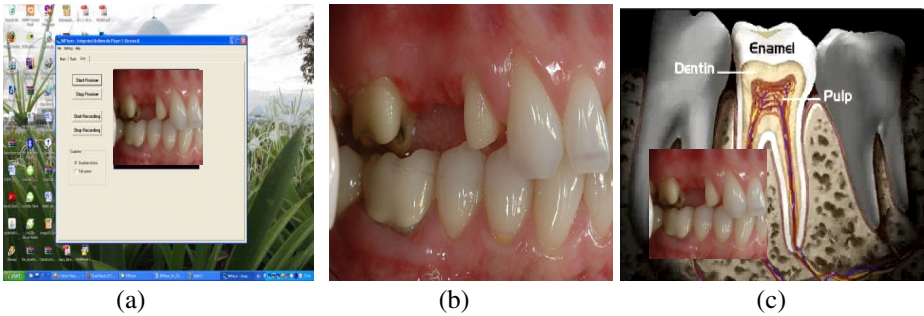
<center>(a)                              (b)                              (c)</center>

**Fig. 6.** (a). The view of IMPlayer operating as live video previewer and capturer (b) The view of live video streaming (c) The view of live video streaming joined with the view of video player. Both (b) and (c) are in secondary monitor.

## 5   Discussion

The multimedia players available today usually have only single file list (media library) for all type of multimedia files. There is no feature to switch quickly when playing each file types. Therefore, it is difficult for user to switch pleasantly between multimedia file types. This style of the user interface does not allow user to play more than one types of multimedia files at same time.

When the user run the conventional multimedia player application sometime the user's view would be an eyesore because the output screen and the control panel (file lists) view are presented in one monitor (same display). There is no multimedia player that specifically designed to utilize dualview feature. With dualview feature the view of output screen and the view of control panel can be separated, for instance the primary monitor for control panel view and the secondary monitor for displaying its output. Another benefit by utilizing the dualview feature is distracting or private information can be hidden from the audience and the available projected area remains unchanged [12].  It can be summarized that the current available multimedia players application only suits for entertain purpose and it is not flexible to support tutoring or teaching learning process.

Since the IMPlayer can be featured with dualview, this player would run in better performance with computer system having a video adapter that supports dualview feature. If it runs in PC with single display video adapter, the view of control panel and its output are in the same display (rather similar with conventional player). Some modern video adapter with dualview feature also featured with TVout port. The TVout port can be connected to TV as secondary monitor instead of LCD projector.

As live video previewer and capturer, the IMPlayer can handle only one video channel. If in the system computer has more than one video channel, it can select among them and only one that can be handled at a time.

Since the IMPlayer can support real time or live video streaming and slide previewer, IMPlayer can be used as multimedia presentation system.

## 6   Conclusion

This paper discussed the IMPlayer based on the proposed system architecture to high-light a new concept of multimedia player application. This is an integrated multimedia player application that can be operated as Audio player, video player, DVD player, Image viewer, flash© player, ppt viewer, video monitoring, video capturing, and audio recorder. It also support multimode player and dualview feature. Since the materials of presentations usually are stored in various multimedia file formats, by utilizing the IMPlayer the educators and students only use a single application to present it all in a flexible way. As a tool, the IMPlayer can be used to support the presentation of visual education since the materials of visual education are video, audio, image, ppt, flash files and camera.

## Acknowledgement

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