#### 1 Introduction

An animation can contain different image and sound files. The images can be displayed at different positions with different sizes. The reusability of the images is ensured by different image elements. A sound file can be played several times in a sequence. A sound element must be created for a sequence. All sound elements can be played simultaneously. An animation can be created with the program "PicturePaint" and can be played in the programs "FileThumbnail", "MediaPlayer", "HelpReader" and "HelpWriter". The file extension is called ".tda" (Two Dimension Animation).

# 2 Value types

Туре	Description	Area			
INT8	8Bit with sign	-128 to 127			
INT16	16Bit with sign	-32.768 to 32.767			
INT32	32Bit with sign	-2.147.483.648 to 2.147.483.647			
INT64	64Bit with sign	-9.223.372.036.854.775.808 to 9.223.372.036.854.775.807			
BYTE	8Bit unsigned	0 to 255			
UINT16	16Bit unsigned	0 to 65.535			
UINT32	32Bit unsigned	0 to 4.294.967.295			
UINT64	64Bit unsigned	0 to 18.446.744.073.709.551.615			
CHAR	8Bit character	0 to 255			
WCHAR	16Bit character	0 to 65.535			
FLOAT	32Bit floating point	± 1.5e-45 to ± 3.4e38			
DOUBLE	64Bit floating point	± 5.0e-324 to ± 1.7e308			
MEMORY	Memory in bytes				
[]	Array	see section 2.1			
-> {	Start of the loop	see section 2.2			
} <-	End of the loop	see section 2.2			
	Next table	see section 2.3			

Table 2: Value types

# 2.1 Array

The set consists of a specific value type. The count of the set is detailed in the information and is usually the previous format value.

Example:

```
A Array INT16[] contains a certain count of INT16 values { INT16, INT16, INT16, INT16, ... }.
```

INT16[], BYTE[], UINT32[], WCHAR[], usw.

# 2.2 The loop

In a loop, the format is repeatedly run through. The count of run through is specified in detail in the information and is usually the previous value.

#### 2.3 Next table

The file format is displayed further in the section and the table specified.

# 3 Description

# 3.1 File format

Туре	Name	Description	
UINT32	IDNumber	The file must have the ID number (0x41504454).	
INT64	FileSize	Specifies the total file size in bytes.	
BYTE	Version	The file version for this description must be 1.	4.3
INT32	ThumbnailSize	The size of the thumbnail in bytes.	
MEMORY	ThumbnailImage	The memory is an image file.	4.5
UINT32	DisplayColor	The background color of the presentation.	4.6
INT32	DisplayWidth	The width of the presentation.	4.7
INT32	DisplayHeight	The height of the presentation.	4.8
INT32	TimeTick	The time factor for displaying an display image.	4.9
INT32	FrameCount	The count of frames in the animation	4.10
		3.2 Image format, table 3.2	

# 3.2 Image format

Table 3.1: File format

Туре	Name Description		Info
INT32	ImageCount	The number of the picture.	5.1
-> {	Image		
INT32	ImageNameLength	The number of characters in the name of the image.	
WCHAR[]	ImageName	The name of the image.	5.3
BYTE	ImageMode	The display mode for the image.	5.4
INT32	ImageWidth	The width of the image.	5.5
INT32	ImageHeight	The height of the image.	5.6
INT32	ImageItemWidth	The width of an image section.	5.7
INT32	ImageItemCount	The number of image sections.	5.8
INT32	ImageMemorySize	The size of the image memory in bytes.	5.9
MEMORY	ImageMemory	The image memory in the file format.	5.10
} <-	Image		
		3.3 Element format, table 3.3	

## 3.3 Element format

#### Name Description Info Туре INT32 ItemCount The number of elements. 6.1 -> { Item INT32 ItemImageIndex The reference number of an image. 6.2 6.3 INT32 ItemMemorySize The memory size of an animation element in bytes. The memory of an animation element. 6.4 MEMORY ItemMemory } <-Item 3.4 Sound format, table 3.4 . . .

Table 3.2: Image format

Table 3.3: Element format

File format: 2D Animation

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# 3.4 Sound format

Туре	Name	Description	Info
INT32	SoundCount	The number of sound files. End of file at value 0.	7.1
-> {	Sound		
INT32	SoundNameLength	The number of characters in the name of the sound file.	7.2
WCHAR[]	SoundName	The name of the sound file.	7.3
INT64	SoundDuration	The playback length of the sound file.	7.4
INT32	SoundMemorySize	The memory size of the sound file in bytes.	7.5
MEMORY	SoundMemory	The memory of the sound file.	7.6
} <-	Sound		
		3.5 Sound element format, table 3.5	

#### Table 3.4: Sound format

# 3.5 Sound element format

Туре	Name	Description	
INT32	SoundItemCount	The number of sound elements.	
-> {	SoundItem		
INT32	SoundItemIndex	The reference number of a sound file.	8.2
INT32	SoundItemRuns	The number of start numbers.	8.3
INT32[]	SoundItemMemory	The memory with start numbers.	8.4
} <-	SoundItem		

Table 3.5: Sound element format

# 4 Information about the file format

#### 4.1 Identification number

The identification number identifies the file format. The number can also be represented with 4 letters (TDPA: Two Dimension PicturePaint Animation).

#### 4.2 File size

The file size is given in order to be able to recognize a mistake.

# 4.3 Version number

The version number is always 1 for this format description.

# 4.4 Thumbnail size

The thumbnail size can be 0 if no preview image is included. The size is specified in bytes. It can not be negative.

# 4.5 Thumbnail

The thumbnail is a freeze frame from the animation. The image can be stored in the PNG, JPEG, TIFF or BMP formats. The default is PNG format.

# 4.6 Background color

The background color is an ARGB color. It can also be transparent (0x00 ... to 0xFF ...). If no background color is used, the value is 0 (0x0000000).



# 4.7 Display width

The width of the animation presentation in pixels. The value can not be less than 1 and greater than 32,000.

## 4.8 Display height

The height of the animation representation in pixels. The value can not be less than 1 and greater than 32,000.

## 4.9 Time factor

The time factor is multiplied by 15 ms and the result is the display time of a frame. The display time is multiplied by the number of individual images and results in the playback time of the animation. The time factor can not be less than 1 or greater than 100,000.

#### Example:

Figure 4.10 shows a time factor of 4 with 5 individual images. The time factor corresponds to a display time for a single image of 60 ms ( $4 \times 15 \text{ ms} = 60 \text{ ms}$ ).



Figure 4.10: Single images on the time axis

#### 4.10 Number of frames

The number of frames in an animation can not be less than 1 and greater than 100,000. A maximum of 15 ms can be used to create a single image. The playback time of the animation results from the time factor times 15ms times the number of individual images.

Playback time: TimeTick \* FrameCount \* 15ms

#### 5 Information about the image format

#### 5.1 Number

The number of images included. The value can not be less than 1 and greater than 100,000. The run of the loop (Image) is determined by this value.

#### 5.2 Name length

The number of characters in the name of the image.

### 5.3 Name

The name consists of a certain number of characters (letters). The name length (5.2) determines the number of characters. A character is a 16-bit unsigned value. The memory size for the name results from the name length times 2 bytes.

Memory size: ImageNameLength \* 2Bytes (16Bit)



#### 5.4 Modus

The display mode indicates which alpha color components are contained in the image. The mode can not be greater than 2. A pixel is a 32-bit color with the format ARGB (alpha, red, green, blue). The alpha value determines how images are drawn one over the other.

Name	Value	Description		
Normal 0 All pixels are opaque. Alpha must be 255.		All pixels are opaque. Alpha must be 255.		
Transparent	1	Pixels can be transparent. Alpha can be 0.		
Alpha	2	Pixels can be transparent. Alpha can be 0 to 255.		

Table 5.4: Display Mode

#### 5.5 Image width

The image width is specified as a reference value for the image file. It can not be less than 1 and greater than 32,000 pixels.

## 5.6 Image Height

The image height is specified as a reference value for the image file. It can not be less than 1 and greater than 32,000 pixels.

## 5.7 Section width

An image can be divided into horizontal sections. The width is specified in pixels. The value can not be less than 1 and larger than the original width (5.5). If the number of the original width is the same, no sections used.

#### 5.8 Number of sections

With the number and the width (5.7) smaller images can be created. The height corresponds to the image height (5.6). The value can not be less than 1 and larger than the original width (5.5). If the number is 1, the entire image is used without any sections.

#### 5.9 Memory size

The value specifies the size of the image file in bytes.

# 5.10 Memory

The memory contains an image file. The file can be formatted as PNG, TIFF, JPEG or BMP. As a standard, lossless compression, e.g. PNG can be selected.

#### Example:

Figure 5.10 shows a time recording of a rotated hour glass. The image has the dimensions  $300 \times 30$  pixels and is divided into 10 sections (5.8). A section has the width (5.7) and height (5.6) of 30 pixels and is differentiated by an index from 0 to 9.



Figure 5.10: hour glass

## 6 Information about the image element format

### 6.1 Number

The number of image elements in the file. The value can not be less than 1 and greater than 100,000. The run of the loop (Item) is specified with this value.

## 6.2 Reference number

The reference number indicates the image for the display. The images begin with the number 0. The number can not be less than 0 or greater and equal to the number (5.1) of the images.

#### 6.3 Memory size

The size of the element memory in bytes.

#### 6.4 Memory

An element contains information about how to display an single image in the animation. The memory contains coordination, sizes and section numbers. The image with the reference number (6.2) is drawn with these values in the representations. For each frame (4.10) of the animation, a formatted value set is present in the element memory. The number of values is determined by the format type (6.4.1).

Туре	Name	Description	
BYTE	ItemType	The format type with a value of 0 to 8.	6.4.1
INT16	ItemX	The X coordinate in the display (representation).	6.4.2
INT16	ItemY	The Y coordinate in the display (representation).	6.4.2
INT16	ItemWidth	New image width in pixels.	6.4.3
INT16	ItemHeight	New image height in pixels.	6.4.3
INT16	ItemIndex	Index of an image section	

Table 6.4: Element memory

#### 6.4.1 Format type

The format type specifies how many and which values must be loaded. Type 2 and 6 may have a poor display quality but must be drawn quickly. Type 3 and 7 can have good display quality and do not need to be displayed quickly. Type 4 and 8 can have very good display quality and can be drawn slowly.

Туре	х	Y	Width	Height	Index	Description	
0						Image is not displayed.	
1	х	Х				Image is displayed in original size.	
2	х	Х	Х	Х		Image stretched. Quality: bad	
3	х	Х	Х	Х		Image stretched. Quality: good	
4	Х	Х	Х	Х		Image stretched. Quality: very good	
5	Х	Х			Х	Cut in original size. Index: figure 5.10	
6	х	Х	Х	Х	Х	Cut stretched. Quality: bad	
7	Х	Х	Х	Х	Х	Cut stretched. Quality: good	
8	Х	Х	Х	Х	Х	Cut stretched. Quality: very good	

Table 6.4.1: Format type

# 6.4.2 Display position

The coordinates X and Y indicate the position of the image in pixels. The coordinate origin (0,0) is the upper left corner. The values are ascending from left to right and from top to bottom.

## 6.4.3 Display size

The width and height change the image size when displayed. The image is reduced or enlarged. In the case of a stretched representation, the speed during drawing is important. That is, the faster the drawing, the worse the quality.

## 6.4.4 Image section index

See Figure 5.10.

## 6.5 Examples

In Example 1, the image segment 0 is drawn in the original size at position 50/50 (X/Y). In Example 2, section 3 is displayed with double the size. The original image with the corresponding index number is shown in Figure 5.10.



Figure 6.5: Examples of image sections

```
(1) Itemtype=5, ItemPosX=50, ItemPosY=50, ItemIndex=0(2) Itemtype=7, ItemPosX=50, ItemPosY=50, ItemWidth=60, ItemHeight=60, ItemIndex=3
```

# 7 Sound format information

#### 7.1 Number

The number of sound files included. The value can not be less than 0 and greater than 100. The run of the loop (Sound) is determined by this value. If the number is 0, the animation is played without sound and the file is here at the end.

#### 7.2 Name length

The number of characters in the name of the sound file.

#### 7.3 Name

The name consists of a certain number of characters (letters). The name length (7.2) determines the number of characters. A character is a 16-bit unsigned value. The memory size for the name results from the name length times 2 bytes.

Memory size: SoundNameLength \* 2Bytes (16Bit)

# 7.4 Playback time

The playing time of the sound file is given in 100 nanoseconds.

## 7.5 Memory size

The value specifies the size of the sound file in bytes.

## 7.6 Memory

The memory contains a sound file. The file can be formatted as WAV or MP3. The memory size is described in section 7.5.

## 8 Information on sound element format

#### 8.1 Number

Represents the number of sound elements in this file. The value can not be less than 1 and greater than 100. The run of the loop (SoundItem) is specified with this value.

#### 8.2 Reference number

The reference number indicates the sound file for playback. The sound files begin with the number 0. The number can not be less than 0 or greater and equal the number of sound files (7.1).

## 8.3 Number of values

The number of values in the array (8.4). The number can not be less than 0 or greater and equal to the number of individual images (4.10).

## 8.4 Value array

The array contains start numbers for playing a specific sound file. The sound file is indicated with the reference number (8.2). The start number can not be less than 0 or greater and equal to the number of frames (4.10) in the animation. The start time results from the start number times the time factor (4.9) times 15ms. The start numbers plus the play time of the sound file (7.4) should not be overlapped.

Start time: Value (INT32) \* TimeTick \* 15ms

#### 8.5 Example

The sound file is started before displaying the image. It will be played until the end, except the animation has arrived at the end. In the example, a sound element with two start numbers is displayed in the value array (8.4). The numbers correspond to the index of the frames  $\{1, 4\}$ . The sound file with the reference number (8.2) has only a very short playback time of 67.5ms for this example. The playing time is shown in red.



<u>Value array</u>: INT32[] = { 1, 4 }

## 9 Program for reading the file format

On the PanotiSoft website, there is a test program under technical documents, with which the file format can be read out in a structured manner. In addition, the program code can also be downloaded. The program was written under Visual Studio 2008 with the programming language C#.

Open	Fi	le: E:\Test\Ar	nimation.tda Forma	at: 2D Animation (.to	da) 🔻
Position	Size	Туре	Name	Value	
0	0		BeginRead		
0	4	UINT32	IDNumber	0x41504454 hex	
4	8	INT64	FileSize	98.286 bytes	
12	1	BYTE	Version	1	
13	4	INT32	ThumbnailSize	0 byte	
17	4	UINT32	DisplayColor	0xFFFFFFFF hex	
21	4	INT32	DisplayWidth	500 pixel	
25	4	INT32	DisplayHeight	500 pixel	
29	4	INT32	TimeTick	4 x 15 ms	
33	4	INT32	FrameCount	100 frames	
37	4	INT32	ImageCount	1 images	
41	4	INT32	ImageNameLength	13 letters	
45	4	WCHAR[]	ImageName	ImageDownload	-

Program:	FileViewerX64.zip FileViewerX32.zip		
Project file:	FileViewerCode.zip		
Description:	FileViewer.pdf		
<u>FileViewerCod</u>	<u>e</u> :		
Format file: Format class:	FileViewerFormat.cs FileViewerTDAnimation		