Skills in developing multimedia standalone application and learning objects: Animation

Fakulti Sains Sosial dan Kemanusiaan UTM

Animation

- Like video
- A sequence of images
  - Create illusion of movement when played in succession
- Commonly used in multimedia projects
- Animation sequence is created as a sequence of frames
- Usually on a timeline

What a Timeline Looks Like in Adobe Flash ?

Frame numbers

A layer with a seqence of frames

Techniques to Create Animation in Multimedia Authoring Program

- Frame-by-frame
- Tweening
- Scripting

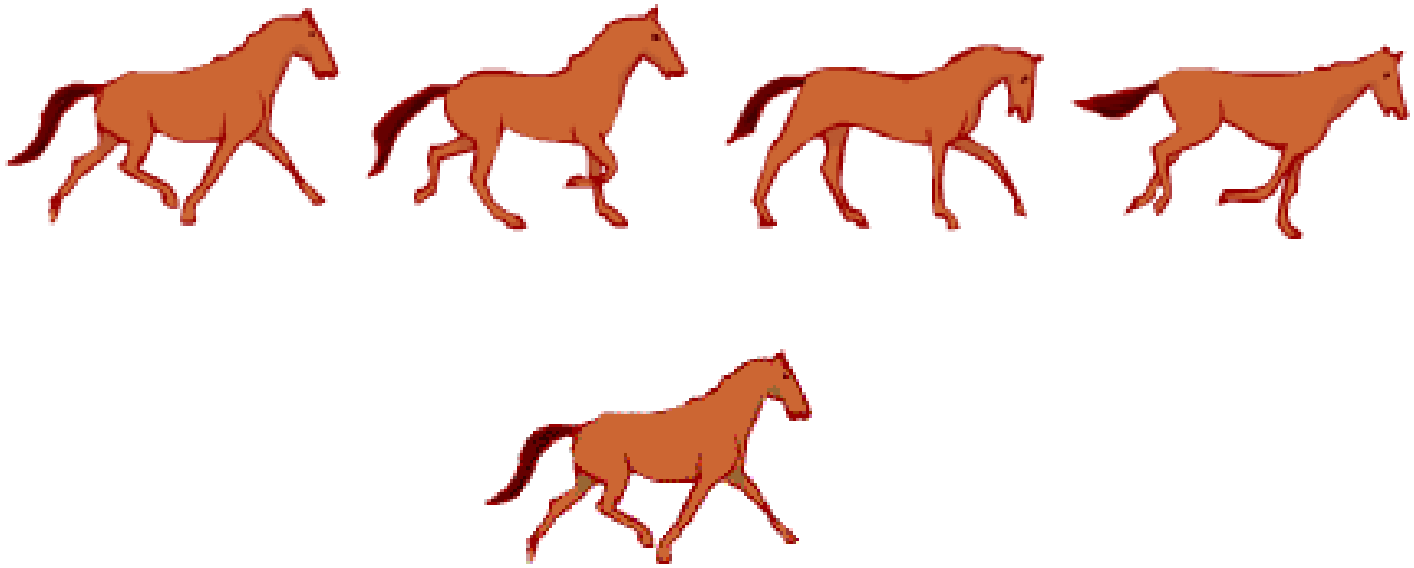
Frame-by-Frame

- By explicitly placing different visual content for each frame
- Each frame is a *keyframe*
  - A frame in which the content is explicitly specified.
  - Different from a frame in which the content is interpolated between frames.
- Like flipbook animation
  http://www.youtube.com/watch?v=zO8MlSjo0T0

Frame-by-Frame Example

Frame:

1 2 3 4



Frame-by-Frame Example

Frame 1 

Frame 2 

Frame 3 

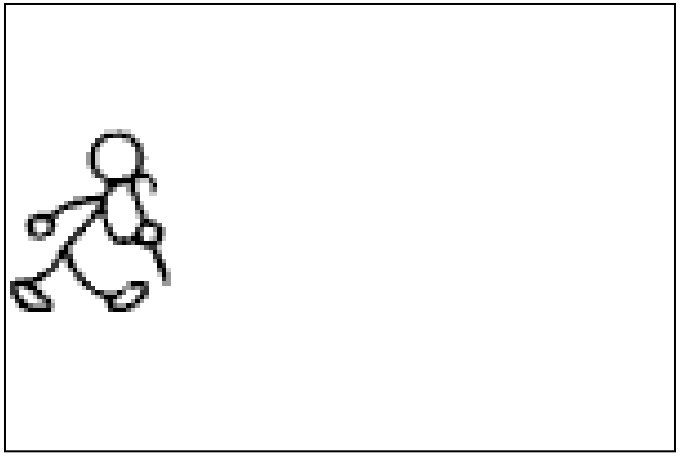
Frame 4 

Frame 5 

Frame 6 

Frame 7 

Frame 8 



Animation playing 5 fps

Tweened Animation

- Content in frames between 2 keyframes is interpolated

- These interpolated frames are called *in-between frames*.

Tweened Animation

In tweened animation,

- what you need to do:
  - create 2 keyframes: frames 1 and 10
  - only explicitly place the character/object at x=11 in frame 1 and x=20 in frame 10
- what the computer does for you:
  - Creates all the in-between frames automatically
  - place the character/object at x=12 in frame 2
  - place the character/objec at x=13 in frame 3
  - place the character/objec at x=19 in frame 9

Example of Bird Tweening Position

Frame 1

Frame 2

Frame 3

Frame 4

Frame 5

Frame 6

Frame 7

Frame 8

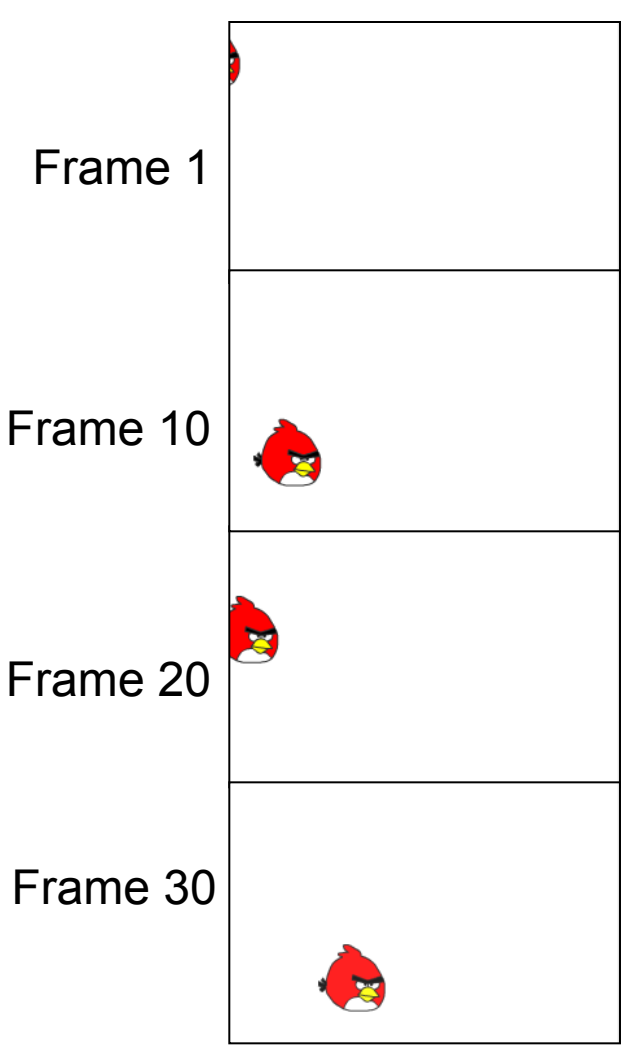
Frame 9

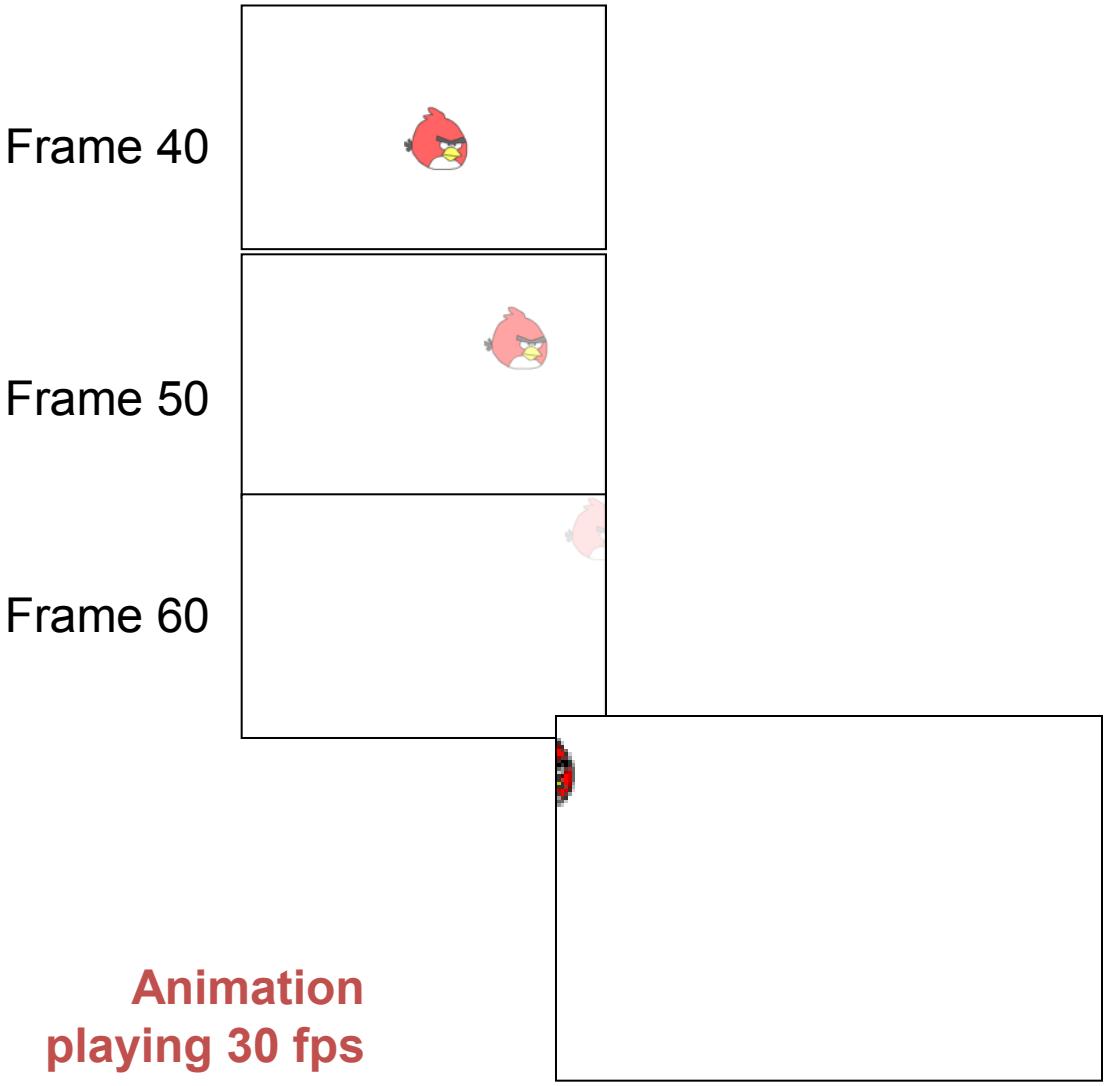
Animation playing 12 fps

What can be tweened?

- Position (shown in the bird example)
- Rotation
- Size
- Color
- Opacity
- Shape

Example of Shape Tweened Bird

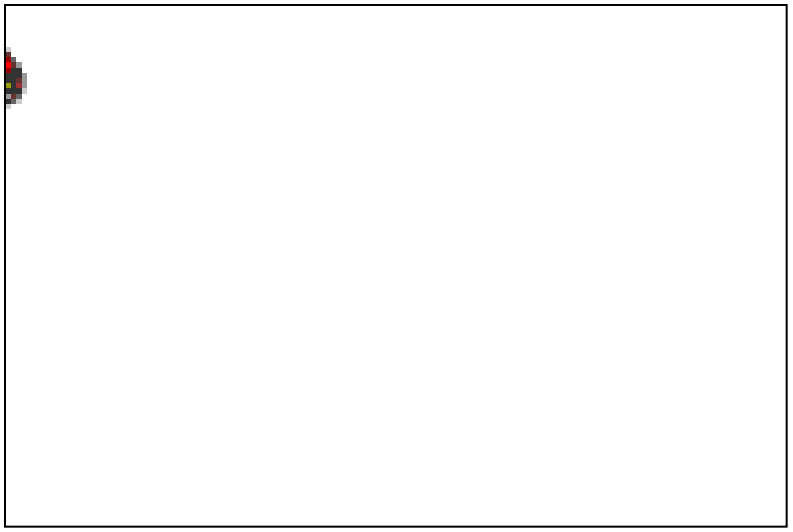




Animation playing 30 fps

Example of Shape Tweened Bird

- Position (tweened)
- Rotation
- Size (tweened)
- Color
- Opacity (tweened)
- Shape (tweened)



Animation playing 30 fps

Animation by Scripting/Programming

- Does not rely on a sequence of frames on timeline

- Dynamic:
  - Animation can be programmed to respond to the user's interaction
  - Animation can be different in a different play through

Frame-by-Frame vs. Tweened vs. Scripted

	Frame-by-Frame	Tweened	Scripted
Rely on a fixed sequence of visual content on timeline	✔	✔	✘
Always same animation every time you play	✔	✔	✘
Dynamic and interactive	✘	✘	✔
Require scripting	✘	✘	✔

Frame-by-Frame vs. Tweened vs. Scripted

	Frame-by-Frame	Tweened	Scripted
Relative work in general required in creating the visual content	**longest**		**shortest**
Choice of animation involving complex or organic motion such as walking and dancing	✔	may be	
Choice of animation involving continuous motion that can be interpolated		✔	✔

Animation Frame Rate

- Playback speed of the animation
- In frames per second (fps)
- Too low: choppy
- Too high:
  choppy if the computer is not fast enough to process and display the frames
- Maximum rate in authoring programs
  - not exceed the frame rate setting
  - not guaranteed to maintain the frame rate
    (slower computer may play at frame rate lower than the setting)

Adjusting Speed of a Frame-based Animation

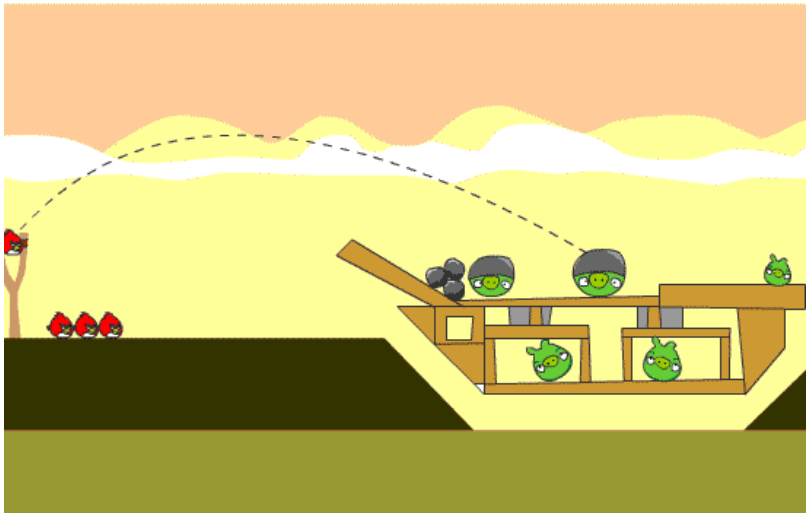
Suppose you have a frame-based animation and want to change its playback speed.

General Strategy: Avoid eliminating frames if possible

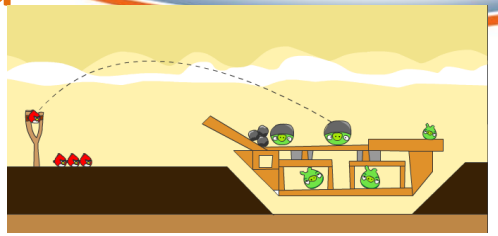
- To speed up:
  - Increase frame rate if possible and keep the number of frames (preferred)
  - Keep the frame rate but reduce the number of frames (not preferred)
- To slow down:
  - Keep frame rate but add more frames (preferred)
  - Reduce frame rate but keep the number of frames

Example of Adjusting Speed

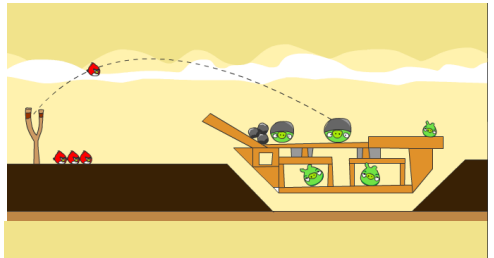
Suppose you have this 5-frame animation and you want to slow it down.



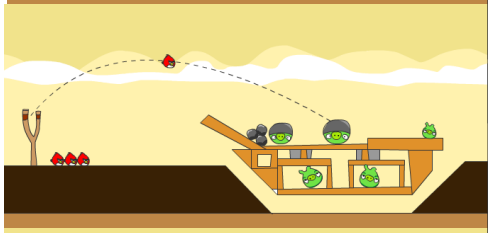
Frame 1



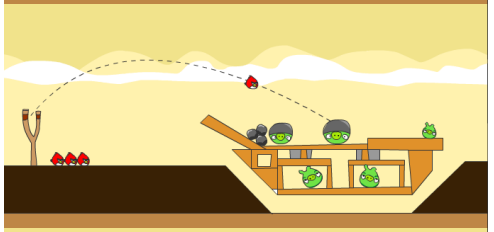
Frame 2



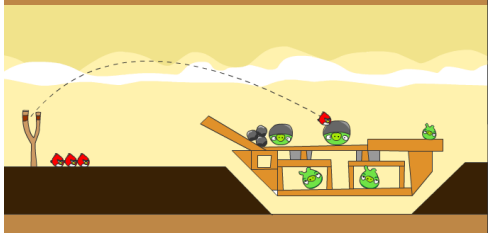
Frame 3



Frame 4



Frame 5



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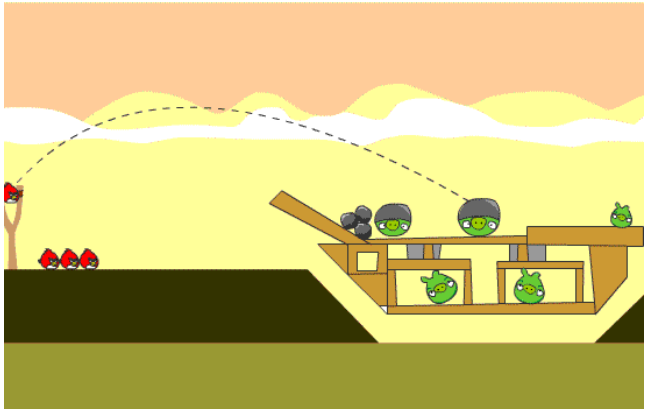
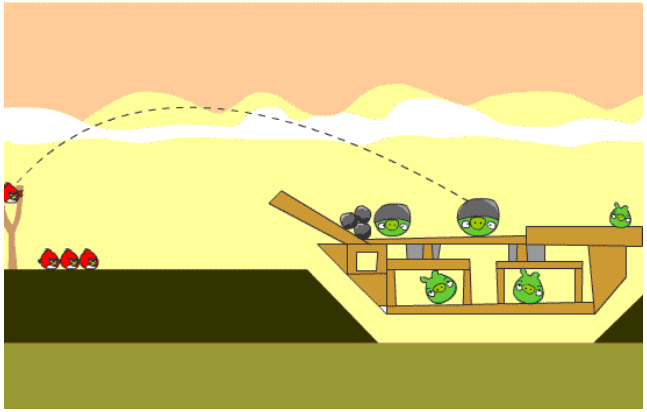


If you reduce the frame rate and keep the same frame number:



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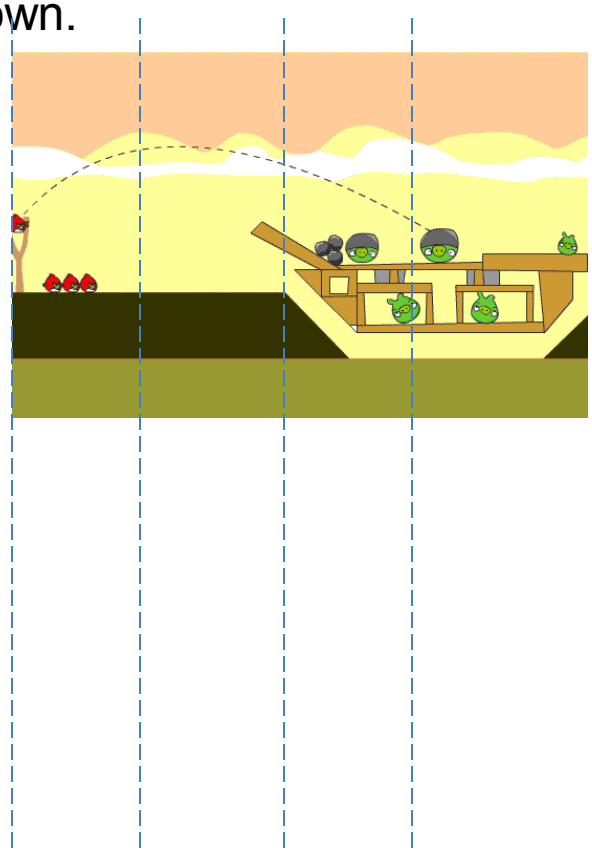

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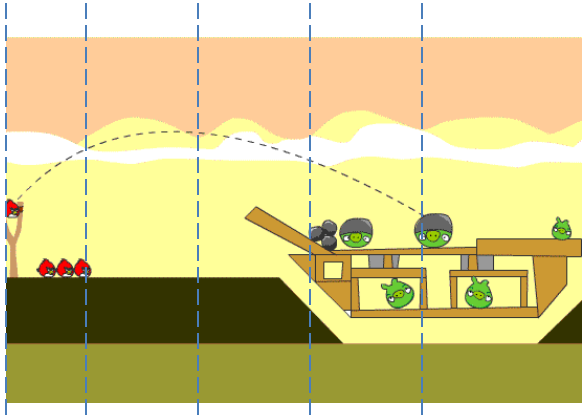

If you keep the frame rate and add more frames: