The Frog's Princess

Technical Design Document

Version 18
© Kathy Smart
26-April-2019

Software
Game systems
Documentation
Prefabbing
Placing characters
Art
VFX
Sound
_Sound compression
_Sound equalizing
_Mixing
_Sound file names
Tags & layers
UI
Navigation

Platforms

PC

Steam

Facebook Gameroom

Android

mobile phones

tablets

Apple

iPhones

tablets

Future 3D version:

Oculus

GearVR

Go

Google

Daydream

Cardboard

Performance limitations & requirements

Maximum

60 frames per second

Minimise

no research done of effect of large volume of audio on game load and game play

Play in Landscape orientation only due to detailed Landscape settings

Engine

- Unity 2017.4.6f1

REASONS

- Unity 2018 has Terrain issues and may have other issues
- 2017.4.6f1 is fully supported for the next 2 years
- pre-existing code base, no need for custom built engine
- existing compatibility for all target platforms
- superior portability to UnrealEngine
- native support for Photoshop and Maya
- faster iteration allows rapid prototyping due to

the ability to see the game in the editor

- strong documentation and existing forum community
- popular engine, assuring longevity
- free until sell $100,000 then only subscription, not % of gross profit
- no requirement to report sales quarterly

Other Software

- Unity Collaborate for source control
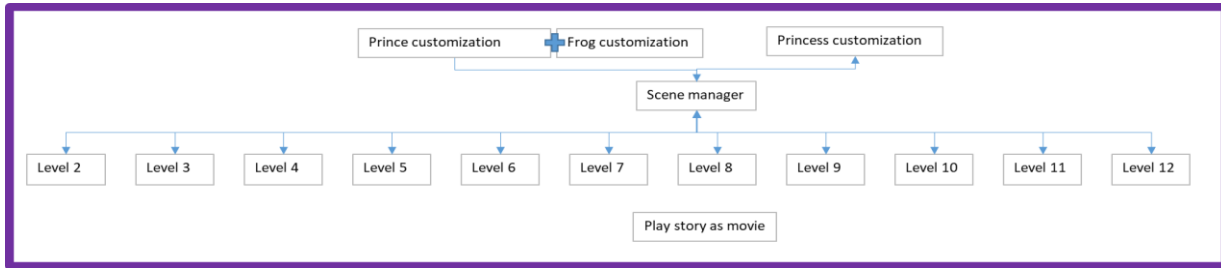- C# for scripts

        REASONS
- native Unity use
- more safeguards than Java
- programmer and designer familiarity

- Visual Studio 2017 – Unity debugging
- C# software development
- Unity plug ins:
  - Fungus plug-in
    REASONS
    - skill and time constraints prevent in-house canvas management
    - robust screen output on every platform
    - excellent features for visual novels
    - free to use and needs no license to commercialise
  - TextMesh Pro plug in
  - Mulligan Renamer plug in
  - QHierarchy plug in
  - Screenshot plug-in in Unity 3D art project
  - QuickLabelr plug-in in Unity 3D art project
- Maya – Modelling of assets
- Photoshop – Creation of textures
- Audacity – Sound recording and editing
- Microsoft Excel - dialogue lists
- Google Sheets - document control for scenes and camera prefabs
- Google Sheets - dialogue lists for sound engineer who has MAC
- Google Sheets - 3D artist to do list
- Microsoft Powerpoint - UI prototyping
- Microsoft One Note - 2D artist to do list
- Discord - team communication and small file sharing
- Dropbox - large or permanent file sharing and storage
- Jira for bugs

Original game plan included character customization and movie play:

| Prince customization | Frog customization | Princess customization |

Scene manager

| Level 2 | Level 3 | Level 4 | Level 5 | Level 6 | Level 7 | Level 8 | Level 9 | Level 10 | Level 11 | Level 12 |

Play story as movie

Game manager

Splash screen
Title screen
Different storylines for different characters
Different storylines for standard or extended versions
Loading icon
Go to Credits at end of Chapter 12

Scene manager (Fungus)

Background fade-in
Sprite active
Sprite animation
Sprite movement
Camera movement
Dialog play
Text play
Music
Looped SFX
SFX
VFX active

Mood manager

Mood display
Tell scene manager what dialog and text to play

Sound manager

Sound library
    music
    SFX looped
    SFX
    dialog
Mix sounds

Character customization

Character customization
5 saves per character

UI manager

HOME

New game >> Confirm menu
Save game >> File name list
Load game >> File name list
Go to Customization menu
Options

Music volume >> mute
SFX volume >> mute
Dialogue volume >> mute

Achievements
Disable / Enable icons
Freeze on Portrait / Landscape / Autorotate
Full screen
Pause game
Share
Review
Add to Favorites
Notifications
Hints
Terms
Privacy page
Version page

REFRESH

Play page again

BACK

Go to previous numbered page
(not previously visited page)

SCENE NAVIGATION

Shows 11 chapters
Shows current position of chapter, scene and page
Shows pages read, scenes finished, chapters finished
Allows player to go to different page by moving arrow / selecting page

MOOD

Change mood going forwards from here

PLAY

Go to next action in command list

If SetVisited command reached,
Save choices for this page
Go to next page

Movie creator

Play saved pages in sequence
Choose which story to play and where to start
Play, pause, stop, rewind, fast forward, fast backward
Share movie

Documentation in Resources has notes about how the program works

To create flowcharts using the NavagationManager
        add SetVisited script to the end of every block
        tag flowcharts with Flowchart.
        add FrogNav script
        complete flowchart numbers correctly

Fungus has been revised by Scott
        Now uses TextMesh Pro
                Text has drop shadow
        Rotorz manually updated from Fungus website
        Stage has 15 positions and each of these have 3 different sizes
        Sprites have pivots at bottom
        FadeToView command hides all portraits
                so all portraits must be created on each page
                This enables players to jump into a page from
                anywhere else in the storybook
        Characters no longer take time to fade in
        Chapters prefabbed
        Chapters to be separated into different scenes

Flowchart block names
Any flow chart blocks with P in them will be considered by NavagationManager for game play
        E   Emma only
        F   Francis/Frog only
        X   eXtended version only
        M   pages to be played in different order in Emma path

Fungus command list set up
        Play Music command at beginning of every command list
   replaces any other music
        Play Ambiance 1 2 3 4 commands at beginning of every command list
                each replaces other ambiance for that channel
        Show Sprite before FadeToView command for any sprite to be animated
                Gets in place before page shows, stops flickering
                Moves sprite back if it was moved in previous play
                Enables page refreshes
        Place FadeToView command at beginning of every command list
                This prevents UI such as mood icons from flickering by
                being turned off by Scott's FadeToView

        Set Mood Owner immediately after every Fade To View
                so not hidden by Fade To View but replaces previous
                SetMoodOwner
        SetMoodOwner above each SayDialog unless 0 and staying 0
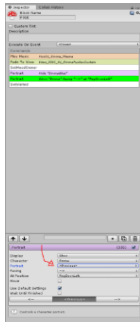
Never leave a command to default to 'previous'

    The pages are not necessarily played sequentially

Always have a music command at the beginning of the command list

    This prevents music from other scenes continuing

    Use looping SFX if no appropriate music

Do not delete blank "Say Dialogs"

    They function as more than text holders

    They hold dialogue such as crowd murmurs or screams

    We want to keep the option open to describe vocalisations

Set Visited command at end of every list

    saves mood choice for that page

    marks that page as visited

Fungus inspector	When creating page, don't copy SetMoodOwner commands in Inspector, create from scratch, else get bound commands
Fungus SayDialog bug	If you leave PlaySound WaitUntilFinished unchecked, then following SayDialog doesn't work

LeanTween

    Use LeanTween not iTween to save CPU

Dialogue design

Never have dialogue playing automatically after sound finishes

    player must press button to get dialogue

Building

    Uncheck SetUp scene

Font

    Vivaldi   **Bevel**

    Amount 0.7

    Offset 0

    Width 0.2

    Glow

    Script to animate

Unity different from build

    Exit buttons don't work in Unity

SetVisited command

    Will only store the last mood set

Camera

    Camera snaps back so change camera z value in Fungus CameraManager

Nomenclature   in Unity, chapters are scenes but in Frog's Princess, scenes
                                are parts of chapters

Prefabbing

Prefab flowcharts but not chapters
Prefabs can't be nested
Prefab backgrounds
Prefab characters
Use prefabbed characters from Characters folder in hierarchy
Use prefabbed backgrounds from folder in hierarchy
Do not prefab sounds, let Fungus handle that
Do not apply prefab on Game_UI from Menu scene.
Do not apply prefab to chapter in ordinary scene, for example Chapter 2
Do not apply prefab to scene flowchart either
This changes the template scene
>> If apply prefab, click on every block and save scene

How to bake prefab:
For example to change the name of a flowchart block or menu title
>> Go to the Template scene
>> Load chapter 0
>> Play
>> Menu
>> Menu
>> Bake Menu
>> Press
>> Wait until button is highlighted again (not grey anymore)
This changes the Menu data in Resources
>> Stop
>> Play
>> Don't save

Art compression

https://answers.unity.com/questions/1206918/crunched-texture-compression-when-to-use.html

Crunch compression only works for dtx (Windows)
>> so bad for Android phones as it adds to runtime
Having said that, we crunched all art to reduce build size

Placing characters

As a result of experimentation, characters have been placed in game in 4 different ways

    Animated characters

           Uses SetAnimation command in Nav command list

           Uses _CharacterSheet in Animations system

           Do not use, move or rename these characters

                All character sprites need to be positioned when game aspect is 1920 x 1080 else they are not located correctly when screen resized

                No longer used in game

    Fungus characters1

           Uses Characters_Fungus folder in hierarchy

           Characters' portraits are brought up on command

           Scott created stage with 15 places and 3 sizes

                To place one character sprite behind another, change its spawn order in the Stage:

                If you Hide a character in the Commands in the inspector

                Then if you show it again, it shows on top of others

                No longer used in game

    Fungus characters2

           Fungus has ability to place small character portrait

           just above dialogue, to speak in voice over mode

                Not used in game

    Direct placement

           Characters are placed on background

                Use characters from hierarchy, these are prefabbed

                To place sprite in background, put in view in hierarchy and make local position 0, 0, 0

                Then flip, size, rotate and move so it looks natural in scene

                Characters at -1 so as not to merge with background

                Background cut outs placed at -4 so as not to interfere with characters

                To fade a sprite in:

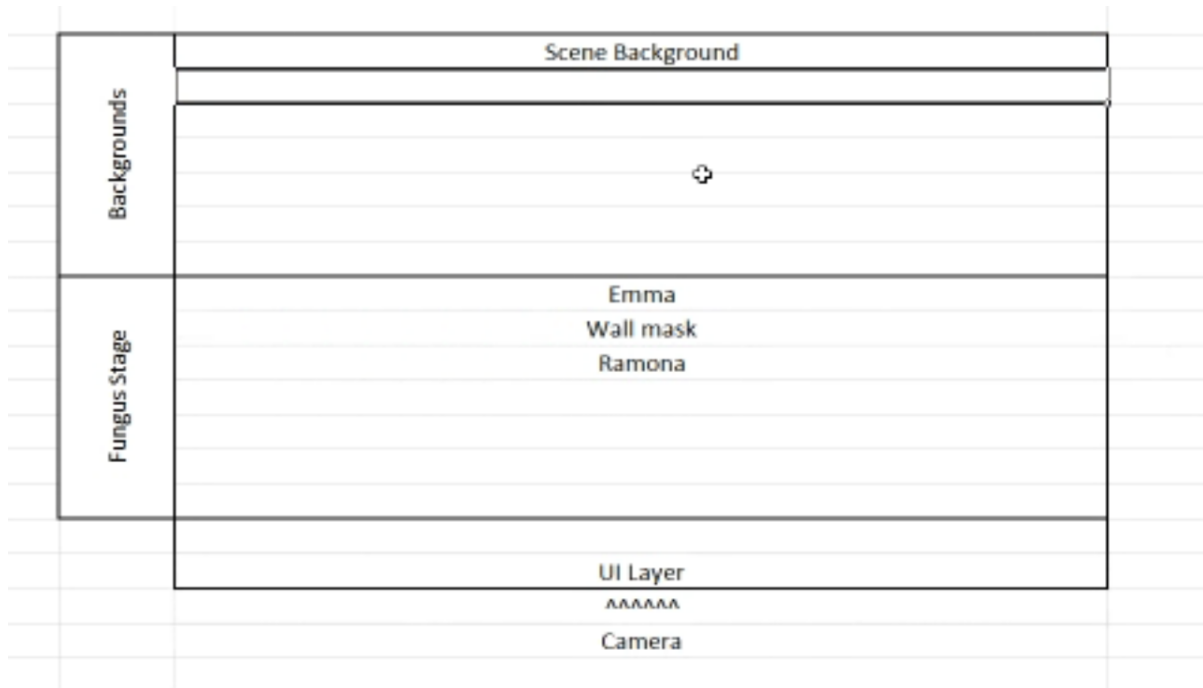   1. place it invisible in scene:

                Fade to white, 0 alpha, 0 duration before FadeToView

                2. fade it in:

                Fade to white, 1 alpha, duration 1

                ------Can just use the command ShowSprite if don't need fade

Backgrounds	Scene Background
	⊕

Fungus Stage	Emma
	Wall mask
	Ramona

UI Layer
∧∧∧∧∧∧
Camera

Size

> All art power-of-two on each side else 10 times the processing

Importing art

> Backgrounds (not cut-outs) have alpha source = none

Art compression

> Individual choice per sprite

> Notes from https://blog.theknightsofunity.com/wrong-import-settings-killing-unity-game-part-1/

> **Texture Type = sprite**

Size

This is where you can decide how big your texture should be and how it should be stored in the device memory. Noticed that there's a Max Size instead of Size? This is simply because you can reduce all the textures resolution for your game in Quality Settings.

Also setting the 2048 as *Max Size* won't guarantee that this texture will be of that size even if *Quality Settings* are set to the highest. The texture resolution will be lower if your original texture file is not big enough. **Knowing that, it is a good practice to prepare textures bigger than you need them to be, because you can always scale them down.**

The Risk: Some models may be small on screen and those models' textures can have large resolutions. You can identify these objects by setting your *Scene* shading to *Mipmaps* :

Format

When your *Texture Type* is set to anything else than *Advanced* you will have 4 options.

Compressed – It trades a little of GPU power for a much lower texture size. *Compressed* option will use the most suitable compressing algorithm for your target platforms.

16 bits – Saves the texture without a compression but it is using 16 bit color palette. Good for textures with small amount of colors.

Truecolor – Saves the texture using uncompressed 32 bit color palette. Looks great, but large 2048×2048 texture will require almost 17 megs of memory.

Crunched – Compressed using compression format suitable for the GPU and then compressed again using compression format that can be handled only by the CPU. Good for downloadable asset bundles.

As you can see, you're trading here texture size for texture quality. My advice is to always set the format **as *Compressed*** until you will see that something is not right with the textures in your game.

UI icons not crunched

VFX folders

       Contain all VFX in folders

            VFX cannot directly be set active/inactive

            VFX can only be set active/inactive by direct parent game object

       Set all VFX folders inactive but set VFX active

            This prevents all particle effects playing as soon as the chapter is opened

       At start of page, set VFX folder inactive before View command

            This is a Fungus peculiarity

       Set VFX folder active when in play

       On subsequent page, set VFX folder inactive before View command

Channels = music amb1 amb2 amb3 amb4/sfx
Dialogue is through Fungus SayDialogue
Short FX is through Fungus PlaySound

Mute is actually volume = 0

There is Ambiance channel 1, 2, 3 and 4 on every page. Set to 0 if not used
This prevents play over subsequent pages
Ambiance works like Music and will continue without a break if repeated on next page

Fungus used to play SFX on Music channel

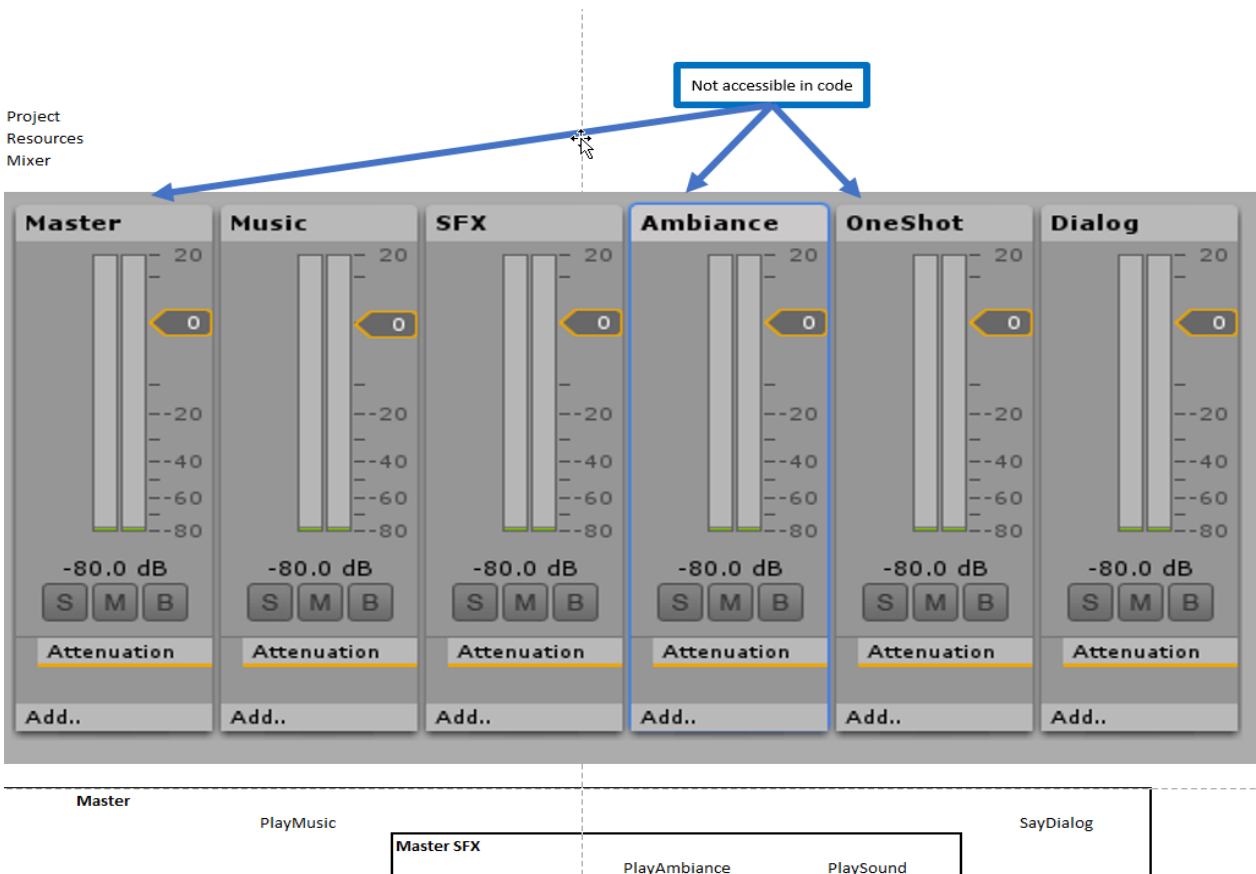**Never loop PlaySound or it will continue to play thoughout that chapter**

Some SFX is played on Ambiance Channel 4

Volume control
Do not alter volume in the mixer
Alter volume in NavagationManager so the Options Menu won't affect it

Mixer setup

Stopping sounds

Fungus can cut off sounds after given time, e.g. 0203_06 play Emma's theme for 0.5 seconds, by putting in PlayAmbiance then StopAmbiance

Options Menu
so overridden in play
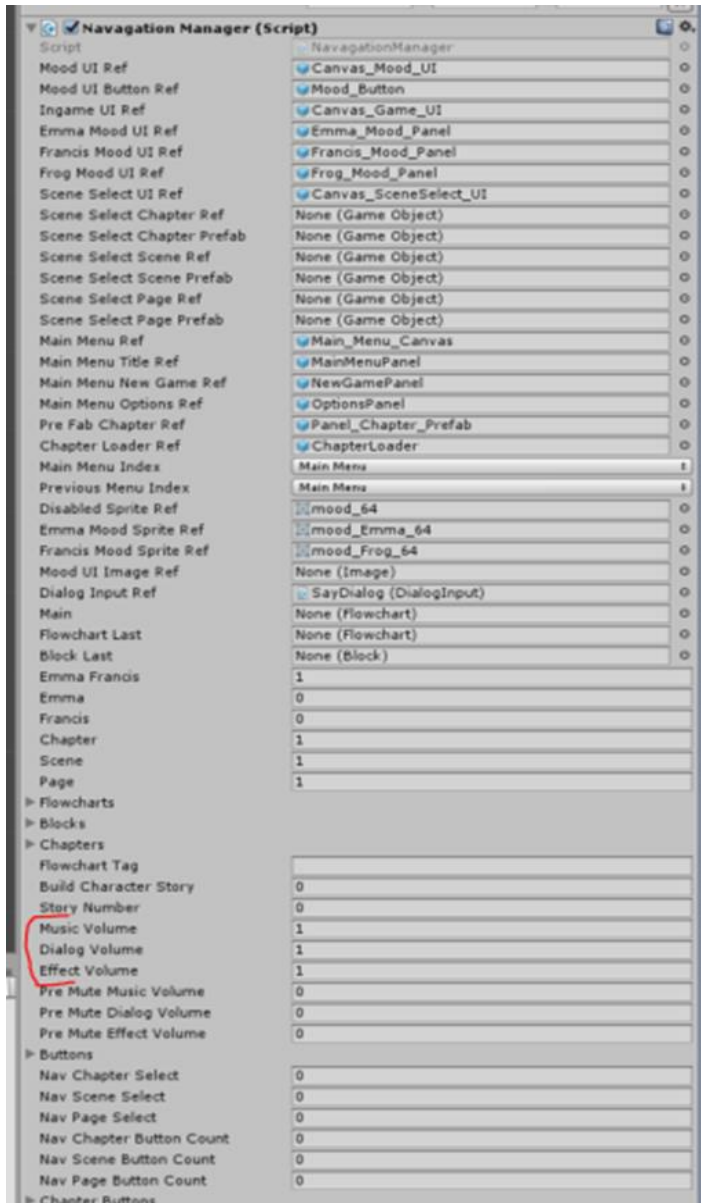
Sound compressed in RAM
        Individual choice per clip

        This reduced memory from 203MB to 80MB

        Notes from http://blog.theknightsofunity.com/wrong-import-settings-killing-unity-game-part-2/ AND http://sicklebrick.com/?p=411

Compressed In Memory – Audio Clip will be stored in RAM and will be uncompressed when played. Does not require additional memory for playing.
Streaming – Audio Clip will be stored on a device persistent memory (hard drive, flash drive etc) and streamed when played. Does not require RAM for storing and playing (at least this value is not significant).
Decompress On Load – Audio Clip will be stored in RAM uncompressed. This option requires the most memory but playing it won't require so much CPU power as the rest.

Music and/or Ambient Sounds

Music is stored in long Audio Clips so it can consume a lot of memory. For sure, we don't want music to be decompressed into the memory then played. You have two options here:

1. Use *Load Type "Streaming"* and *Compression Format "Vorbis"* . This combination will use the least amount of memory but will require some CPU power and disk I/O throughput.
2. Use *Load Type "Compressed In Memory"* and *Compression Format "Vorbis"* . The only difference from the first solution is that it will exchange the disk I/O with some memory requirement. Note that you can adjust the *Quality* slider to decrease compressed clip size in exchange of sound quality. **Usually 100 percent is a way too high. I would recommend something around 70 percent.**

Set your BG music to decompress on load - not sure about this

Anything you'll be using a lot should probably be decompressed on load rather than streaming from the disk (which is slow and can be especially troublesome on Android.) This is another tradeoff situation however, given that decompression can take time and memory. Balance it!
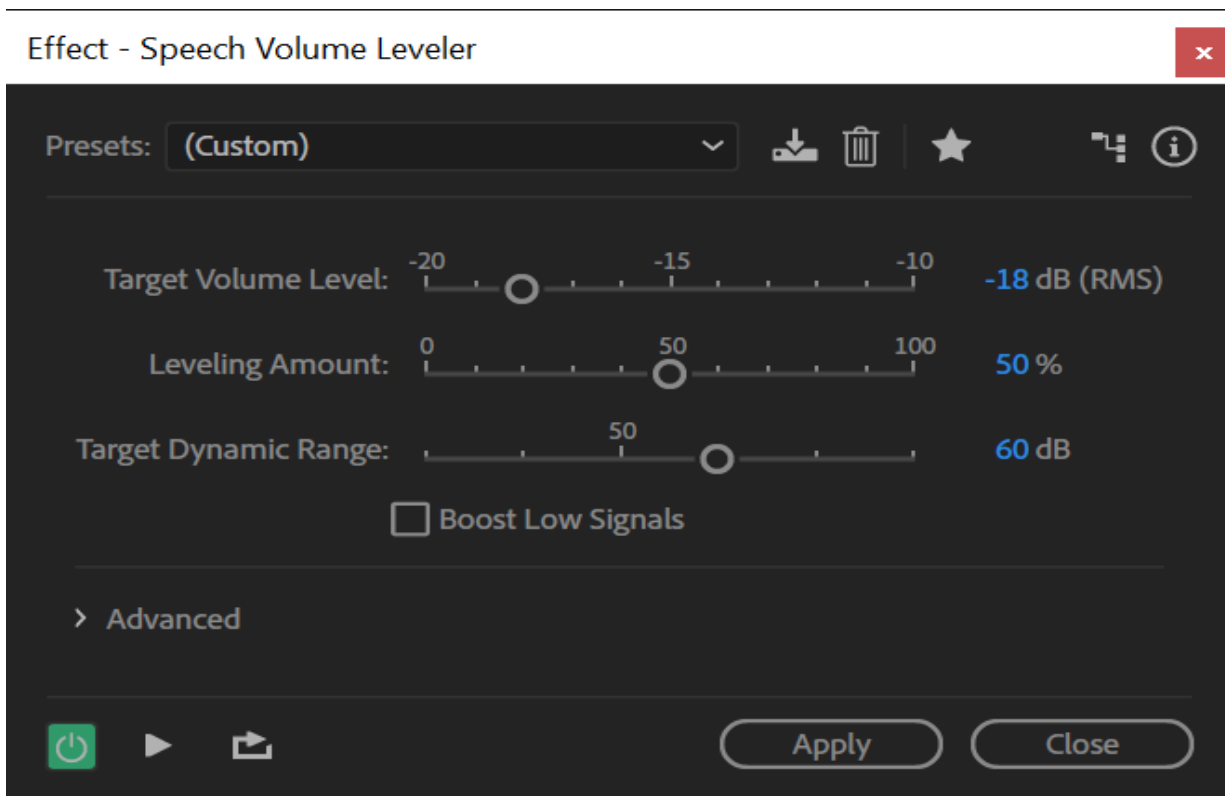**Note that if you have more than 2 music/ambient sounds clips playing like this, it can consume a serious amount of CPU power.**

Sound Effects

Sounds effects are usually short or medium Audio Clips. Also these can be played frequently or rarely. Here are some rules:

1. For **frequently played** and **short** *Audio Clips* use *Decompress On Load* and *PCM* or *ADPCM Compression Format* . When PCM is chosen, no decompression is needed and if audio clip is short it will load very quickly. You can also use *ADPCM* . It requires decompression, but it is much lighter to decompress than *Vorbis* .

2. For **frequently played** but **medium** *Audio Clips* use *Compressed In Memory* and *ADPCM Compression Format. ADPCM* is around 3.5 times smaller than raw *PCM* and decompression algorithm will not consume as much CPU as *Vorbis* .

3. For **rarely played** and **short** *Audio Clips* use *Compressed In Memory* and ADPCM. For the same reason as described in point 2.

4. For **rarely played** and **medium** *Audio Clips* use *Compressed In Memory* and *Vorbis Compression Format* . This SFX might be too long to be stored using *ADPCM* and played too rarely, therefore additional CPU power required to decompress wouldn't be a such pain.

Amplitude
Compression
Speech volume level

Effect - Speech Volume Leveler   ✕

Presets: (Custom) ⌄   ⬇ 🗑 │ ★   ⌗ ⓘ

Target Volume Level: -20   -15   -10   **-18** dB (RMS)
                        ⟨──O─────────────────⟩

Leveling Amount: 0   50   100   **50** %
                        ⟨─────────O──────────⟩

Target Dynamic Range: 50   **60** dB
                        ⟨───────────O────────⟩

                        ☐ Boost Low Signals

  ❯ Advanced

  ⏻   ▶   ⬆   (Apply)   (Close)

To bake menu
        Template
        Chapter 0

Target volume = -18dB
Dynamic range = 60dB

Use Adobe Audition
        Speech Dynamic Range Correction
        Select All
        Run

See following tutorial for doing batch processing in Audacity instead:
https://441k.com/how-to-batch-normalize-audio-with-audacity-5af72aa3505e?gi=7eb756e46362

OR

Do batch processing using Audacity

Normalize the file so the loudest point = -0.01dB
to even everything out

although the loud will be louder

File
Edit Chains
Add
        Name "Normalise to -0.01 dB"
                OK
                        Insert
                                  Select Normalize WAV, OK
                                  Select Export, OK, OK

        Edit Parameters
                Normalize maximum amplitude to -0.1 (not -0.01) to get max dynamic range
                OK
                Ensure Normalize St… Channels Independently is unchecked
                Have Created Batch Processing Chain, OK

        File
                Apply chain

Duplicate Master files, rename ADD NORMALIZED
                Select all files in folder
                Would you like to make a copy? No (As already have made copy)
   Apply preference to everything
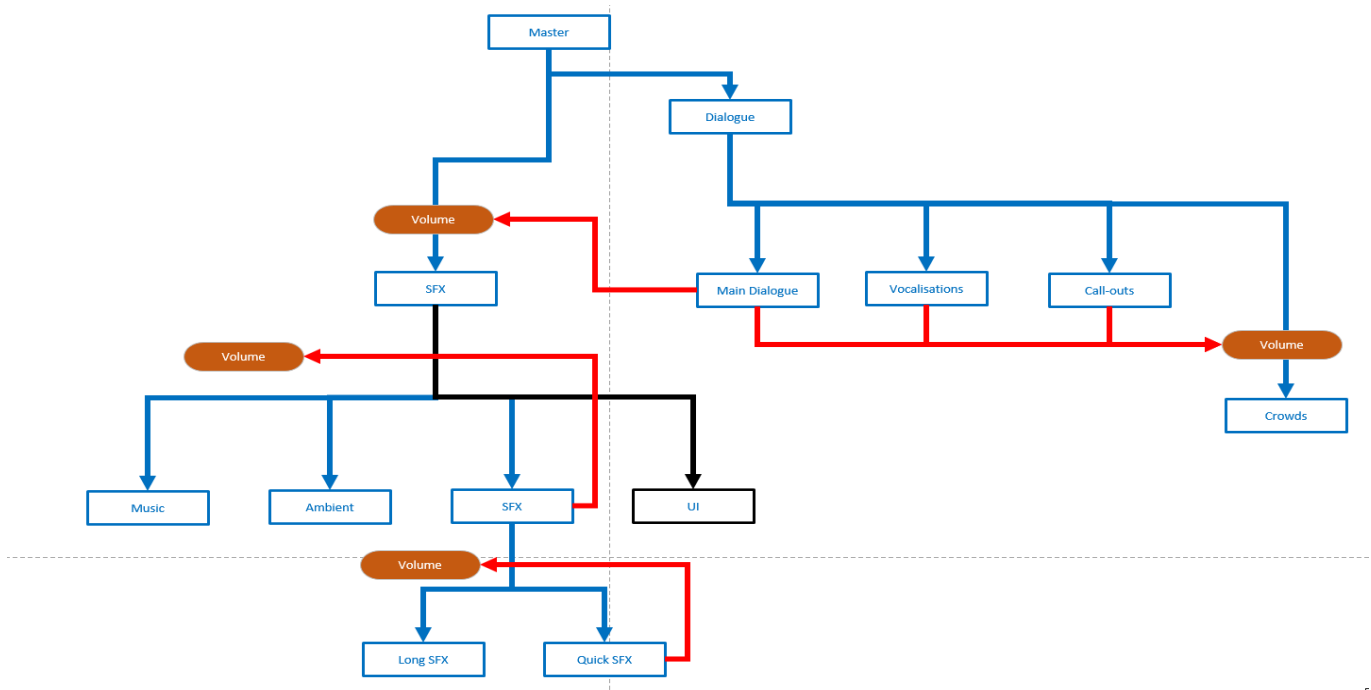
Dialogue file names

* start with character so clips will be recognised by Unity PlaySound
* two digits for chapter number so will sort correctly
* 0 for reading separation
* one digit for scene number
* underscore for readability
* three digits for line number so will sort correctly
* M for mood
* 0-9 for mood number
* underscore for readability
* two characters for character ID, not one or three or will break macro sorting
* underscore for readability
* words from line for easy recognition - this example is a long "abbreviation"

Chapter 2, Scene 3

Line 56

Mood 0 - Iron Henry only ever has one line
so he has default Mood 0

C0203_056M0_IH_INeverBackDown

Dialogue line starts with letter

Line abbreviation

IH - 2 letters to identify character
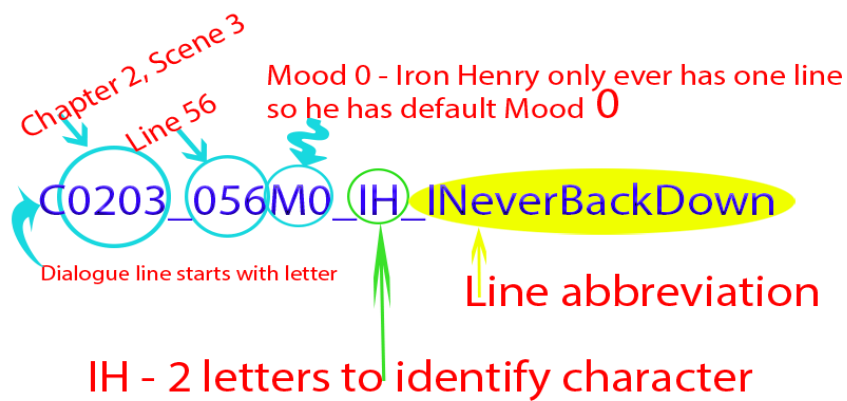
Audio folder organisation

▼ Audio
  ▼ Dialog
    ▶ 02 dialog
    ▶ 03 dialog
    ▶ 04 dialog
    ▶ 05 dialog
    ▶ 06 dialog
    ▶ 07 dialog
    ▶ 08 dialog
    ▶ 09 dialog
    ▶ 10 dialog
    ▶ 11 dialog
    ▶ 12 dialog
      Vocalizations
  ▶ Music
  ▼ SFX
    ▶ Ambient sounds
    ▶ Other looped sounds
    ▶ Single play sounds
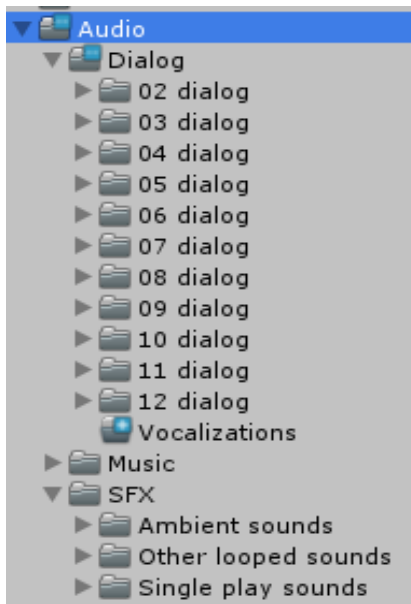
Note in our project we didn't separate vocalisations which made it harder to find
   clips like bird squawks

▼ Audio
  ▼ Dialog
    ▼ 02 dialog
      ▼ 0201 dialog
          C0201_001M0_Fr_HandlingIt
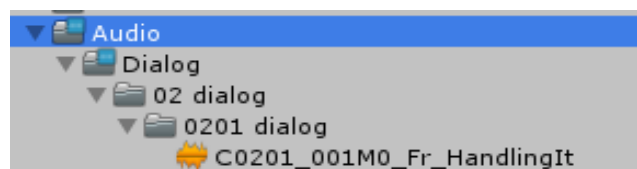
Tags

Tag 0	Flowchart
Tag 1	CharacterSheet
Tag 2	NavagationManager

Sort order

Builtin Layer 0	Default		
Builtin Layer 1	TransparentFX		
Builtin Layer 2	Ignore Raycast		
Builtin Layer 3			
Builtin Layer 4	Water		
Builtin Layer 5	UI		
Builtin Layer 6			
Builtin Layer 7			
User Layer 8			
User Layer 9			
User Layer 10	Background	Views	1
User Layer 11	ParticleFX		
User Layer 12	Character		
User Layer 13	Prop	GoldenBall	2
User Layer 14	Font		
User Layer 15			
User Layer 16			
User Layer 17			
User Layer 18			
User Layer 19			
User Layer 20			
User Layer 21			
User Layer 22			
User Layer 23			
User Layer 24			
User Layer 25			
User Layer 26			
User Layer 27			
User Layer 28			
User Layer 29			
User Layer 30			
User Layer 31			
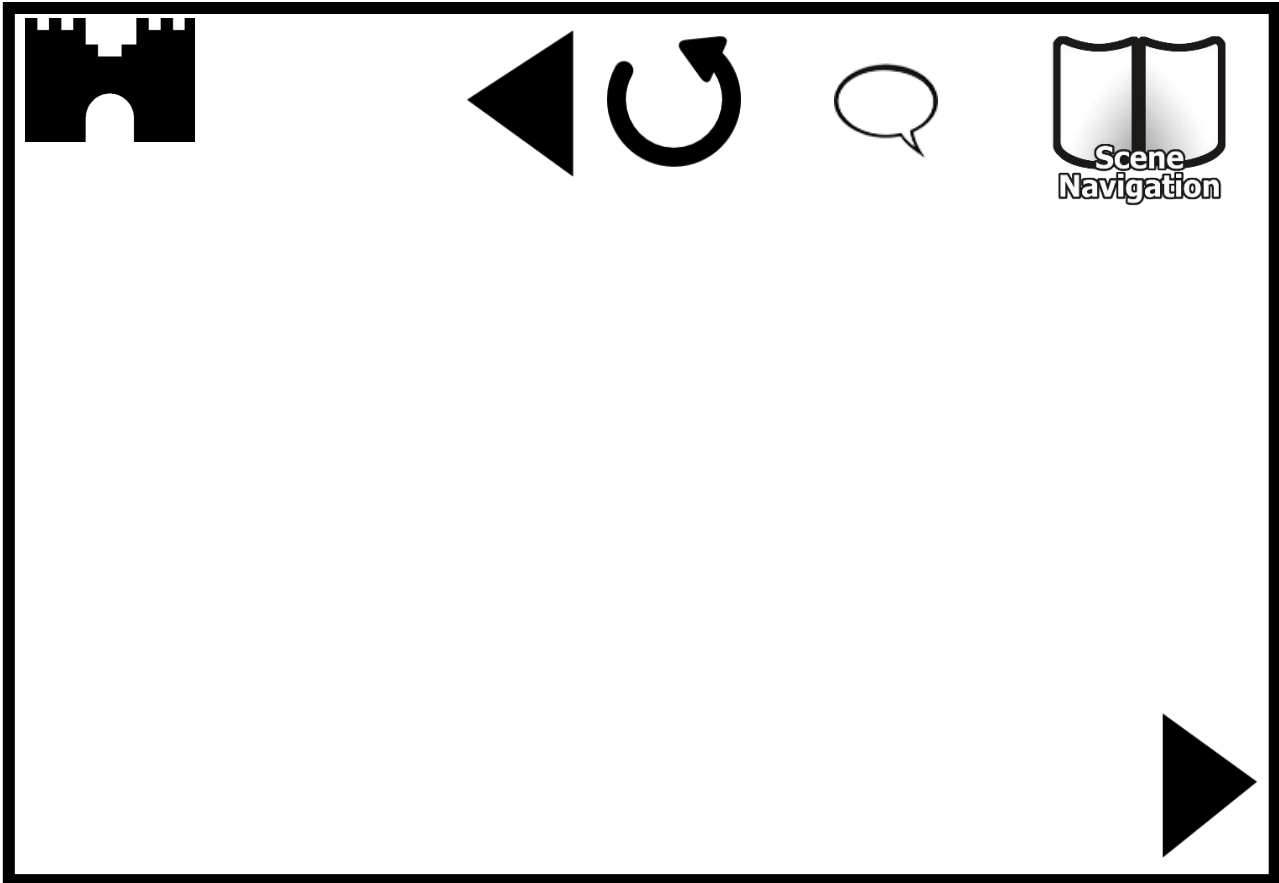
HOME

NEW GAME

SAVE GAME

LOAD GAME

OPTIONS

    MUSIC
    EFFECTS
    DIALOG

    HIDE TEXT

    HIDE ALL UI

NETWORK
Share
Review
Add to Favorites

HELP
Language
Hints
For teachers
Contact
Terms
Privacy
Version

EXIT

https://commons.wikimedia.org/wiki/File:Runner_stickman.png

SCENE NAVIGATION
Completed chapters have gold frames
Current chapter is highlighted
Completed scenes have gold frames
Current scene is highlighted
Completed pages have gold frames
Current page is highlighted
Allows player to go to different page by

BACK
Go to previous page
Do not change the current mood
Do not reverse progression in Scene Navigation

Back button always on
        except when turned off to free clutter
        or during playback of entire storybook
Back button interrupts play and sends player to start of last page
        - may be previous page, may be previous scene, may be previous chapter

REFRESH
Start at beginning of page command list again

FORWARD
Go to next piece of dialog

Forward button always on
        except when turned off to free clutter
   or during playback of entire storybook
Forward button interrupts play and sends player to next piece of dialog.
        May be same block, may be next block,
        may be next page, may be next flowchart
Forward button saves mood choice for dialogue just played

MOOD

Princess mood

Prince/Frog mood
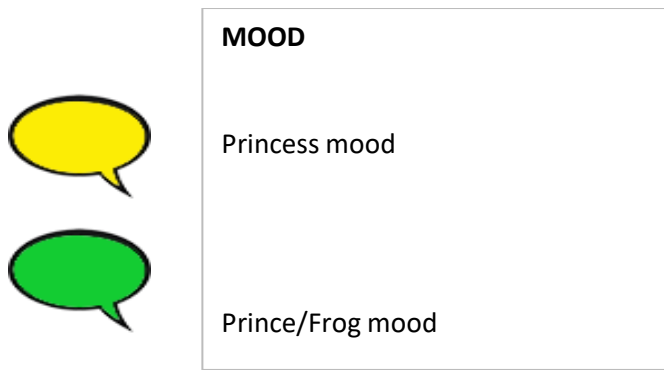
Mood button vanishes when no mood choice available,
        that is, when no main character has dialog or main character has no choice of dialog
Mood button appears as soon as story progresses
        to the part where a main character has dialog
Mood button stays until Play button pressed
Clicking mood button brings up scroll of moods
        for character who is having dialog
Clicking mood button when scroll is showing, closes that scroll
Mood button changes colour if new mood is pressed on the mood scroll
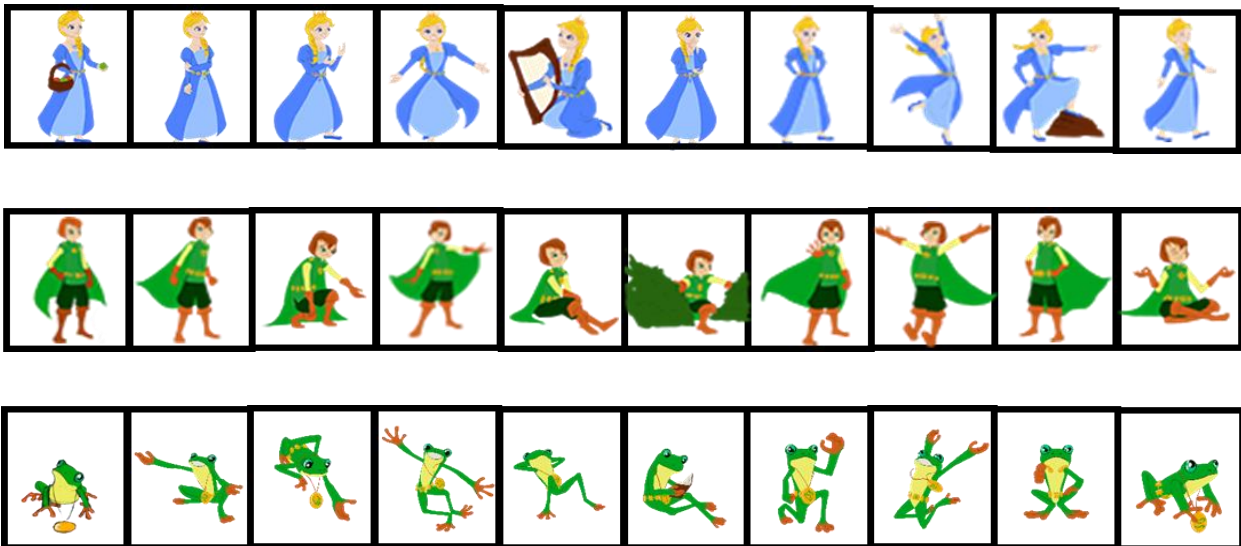
Mood scroll shows moods 0-9 for character having dialog
Mood scroll highlights current mood
Clicking current mood closes mood scroll
Clicking non-current mood
        1 closes mood scroll
        2 restarts dialog with new text and voice
        3 saves mood number for character for this dialog
        4 is default mood for opening new dialog for this character
        unless mood already chosen for next dialog* - subject to playtesting

Headphones recommended