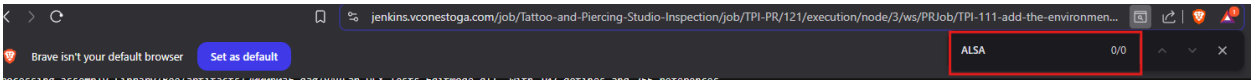
ALSA Issue on Building a WebGL on Linux

- VARLAB 2025 S5 -

Bug Description - This bug is already fixed



Jira Ticket

The WebGL build seems to be failing to import the audio into the simulation
: https://varlab-dev.atlassian.net/browse/CORE-1522

What is ALSA?

: ALSA stands for Advanced Linux Sound Architecture, and it is Linux default audio driver.

Error Logs

1. ALSA lib confmisc.c:855:(parse_card) cannot find card '0'
2. ALSA lib conf.c:5178:(_snd_config_evaluate) function snd_func_card_inum returned **error:** No such file or directory
3. ALSA lib confmisc.c:422:(snd_func_concat) error evaluating strings
4. ALSA lib conf.c:5178:(_snd_config_evaluate) function snd_func_concat returned **error:** No such file or directory
5. ALSA lib confmisc.c:1334:(snd_func_refer) error evaluating name
6. ALSA lib conf.c:5178:(_snd_config_evaluate) function snd_func_refer returned **error:** No such file or directory
7. ALSA lib conf.c:5701:(snd_config_expand) Evaluate **error:** No such file or directory
8. ALSA lib pcm.c:2664:(snd_pcm_open_noupdate) Unknown PCM default

Error Logs Analyzing

1. **ALSA lib confmisc.c:855:(parse_card) cannot find card '0'**
   - ALSA is trying to find a sound card with ID 0, but no such card exists
   - This happens when there is no configured or detected sound device in the system

2. **ALSA lib conf.c:5178:(_snd_config_evaluate) function snd_func_card_inum returned error: No such file or directory**
   - ALSA is evaluating the sound configuration and calling snd_func_card_inum.
   - This function failed because it couldn't find the required configuration file or sound card.

3. **ALSA lib confmisc.c:422:(snd_func_concat) error evaluating strings**
   - ALSA encountered an error while trying to concatenate or process configuration strings.
   - This could be due to a missing or incorrect configuration entry in the ALSA configuration file.

4. **ALSA lib conf.c:5178:(_snd_config_evaluate) function snd_func_concat returned error: No such file or directory**

- ALSA tried to execute snd_func_concat, but it failed because a required configuration file or entry is missing.
- This likely happened due to an incomplete or incorrect ALSA configuration.

5. **ALSA lib confmisc.c:1334:(snd_func_refer) error evaluating name**
   - ALSA attempted to reference a configuration entry, but it failed due to an incorrect or missing reference.
   - This usually means that a required ALSA setting is not properly defined.

6. **ALSA lib conf.c:5178:(_snd_config_evaluate) function snd_func_refer returned error: No such file or directory**
   - ALSA configuration file(asound.conf) is missing

7. **ALSA lib conf.c:5701:(snd_config_expand) Evaluate error: No such file or directory**
   - ALSA tried to expand its configuration, but the required configuration file or device does not exist.
   - Usually occurs when ALSA cannot read the default configuration (/usr/share/alsa/alsa.conf).

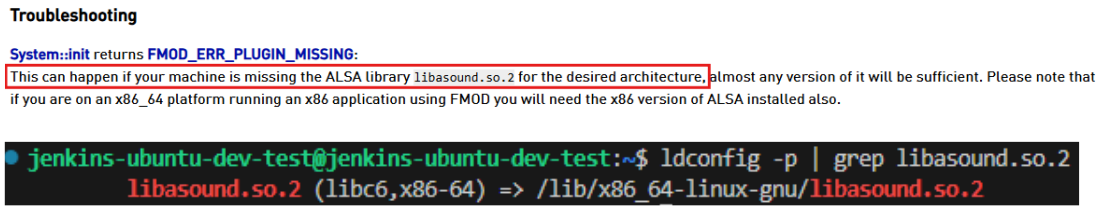
8. **ALSA lib pcm.c:2664:(snd_pcm_open_noupdate) Unknown PCM default**
   - LSA tried to open the default PCM device (default) but couldn't find it.
   - Usually happens when there is no virtual audio device (snd-dummy, etc.) or the default sound card settings are wrong.

Bug Fix

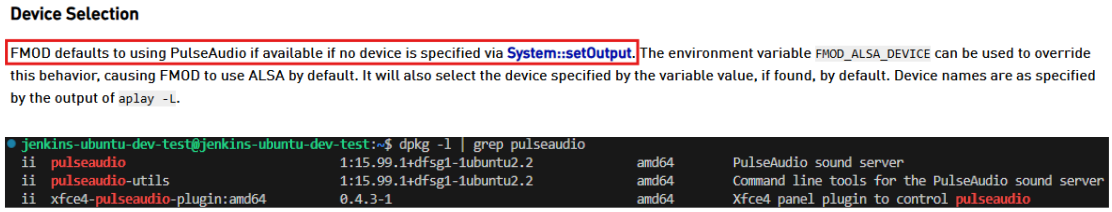
Steps to Fix the Bug

: This document will be useful for reviewing this bug fix proccess

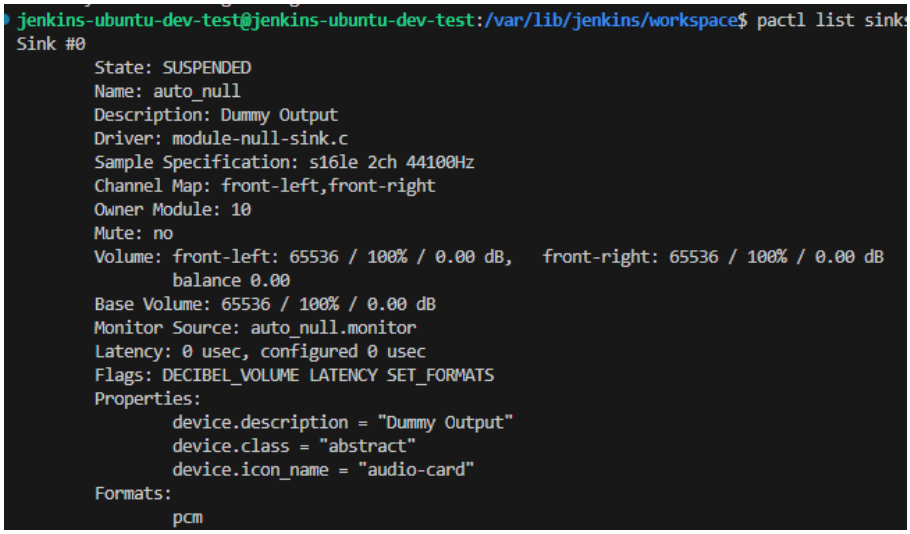
1. **Install** [lisaound2]
   sudo apt update
   sudo apt install libasound2
   ldconfig -p | grep libasound.so.2 (Check the installation)



2. **Install** [PulseAuido]
   sudo apt update
   sudo apt install pulseaudio
   ps aux | grep pulseaudio (Check the installation and Process running)



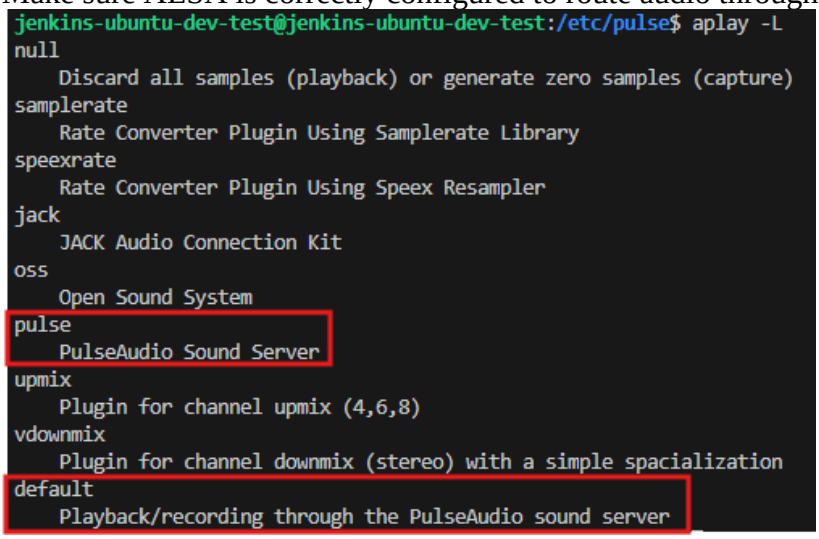
   pactl list sinks (A list of output devices (sinks) currently recognized by PulseAudio)



   It's not a problem that it's SUSPENDED now

   When FMOD starts initializing and playing, it will change to RUNNING normally

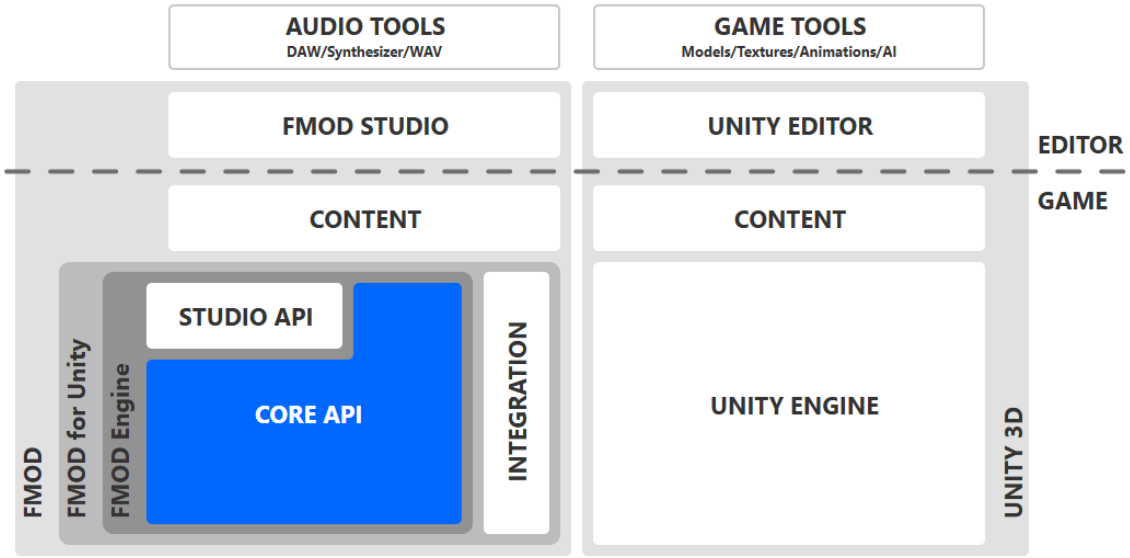
3. Make sure ALSA is correctly configured to route audio through PulseAudio.



Analyzing

Why we WebGL needs 'ALSA'?

: Unity's built-in audio system is powered by **FMOD Core API**, which handles low-level audio management.
This is **separate and independent from** the **FMOD Studio** system, which is a full-featured **audio middleware** that integrates with Unity via an external plugin (FMOD Studio Unity Integration).



Core API: An interface to the low level features of the FMOD Engine, ideal for adding custom features and providing deeper access to hardware functionality.

Unity initializes **FMOD Core API**, the low-level audio engine that powers Unity's built-in audio system. As part of this initialization, FMOD Core API directly interfaces with the underlying audio architecture of the host operating system — **WASAPI** on Windows, **ALSA** on Linux, and **CoreAudio** on macOS.

> [Discussions of Unity Base Audio Engine]
> >> https://qa.fmod.com/t/is-unitys-audio-system-actually-fmod-core/17463
>
> >> https://discussions.unity.com/t/unitys-base-audio-engine/829921
>
> [Article for running and trouble shutting about Unity on Linux headless environment]
> >> Running Unity3D in a Virtualized Headless Ubuntu Environment | by Jon Ibasco | Medium

For more details about FMOD features on different operating systems, please refer to this FMOD documentation and This YouTube video can give a better understanding of the relationship between 'FMODE' and 'Unity'.

In conclusion, ASLA and FMOD related issue may occur if we change our target player WebGL to other, but it is not a big deal right now

Target Platform Whether to use FMOD	
WebGL	Doesn't use FMOD Core API (replaces Web Audio API)
Windows	Use FMOD Core API
macOS	Use FMOD Core API
Linux	Use FMOD Core API
Android	Use FMOD Core API
iOS	Use FMOD Core API