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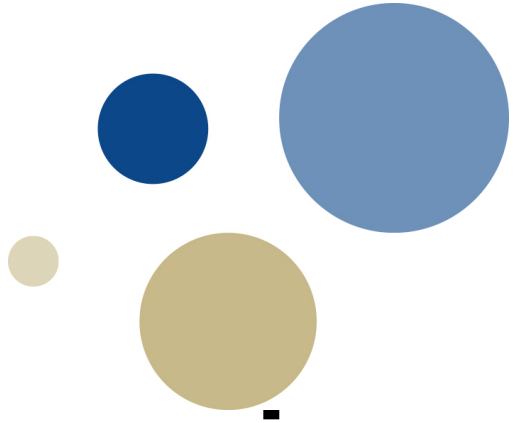

MCT4048: Audio Programming

The Fundamentals: Sound Effects

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Department of Music, NTNU

7 February 2019

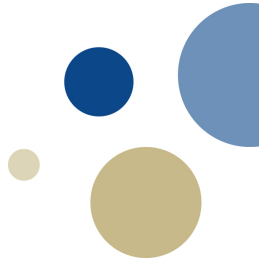
Assignment 1: Presentation WAC paper (individual)

Present a summary of a WAC paper of your choice to the class.
The presentation should last 5 min + 1 min for questions.

Schedule of presentations 7.2.19:

- Ashane
- Eigil
- Eirik
- Guy
- Jonas
- Jørgen

This Week: The Fundamentals (40% Individual Work)



- **Syllabus**: `https://uio.instructure.com/courses/17406`
- **Assignment 1** (Total grade: 10%): Presentation WAC paper (individual) – **day 3 (February 7, 2019)** or 4 (February 8, 2019)
- **Assignment 2** (Total grade: 20%): Presentation mini-project 1 (individual) – days 2 (February 6, 2019) (5%), **3 (February 7, 2019) (5%)**, 4 (February 8, 2019) (10%)
- **Assignment 3** (Total grade: 10%): Written blog post about the mini-project 1 – February 11, 2019

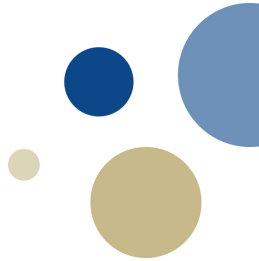
Program: Day 3 – 7 February, 2019

- 9.15-10.30: WAC paper presentations (1/2)
- 10.30-11.00: Setting up computers with the tools for the tutorial
- 11.00-12.30: Tutorial: Dealing with sound effects
- 12.30-13.00: Lunch break
- 13:00-15:00: Mini-project 1 development (3/4)
- 15.00-16.00: Speedy presentations mini-project 1 (2/3)

Learning Outcomes

- Get a sense of the available effects in Web Audio.
- Get familiar with how the effects nodes can be incorporated in the node graph.
- Be able to create an independent project relating concepts and building up from previous knowledge.

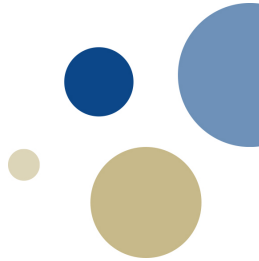
Start setting up...



Download:
`https://github.com/axambo/audio-programming-workshop/`

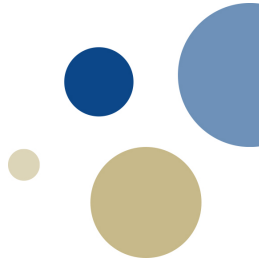
Go to: code/d3/

Debugging JavaScript



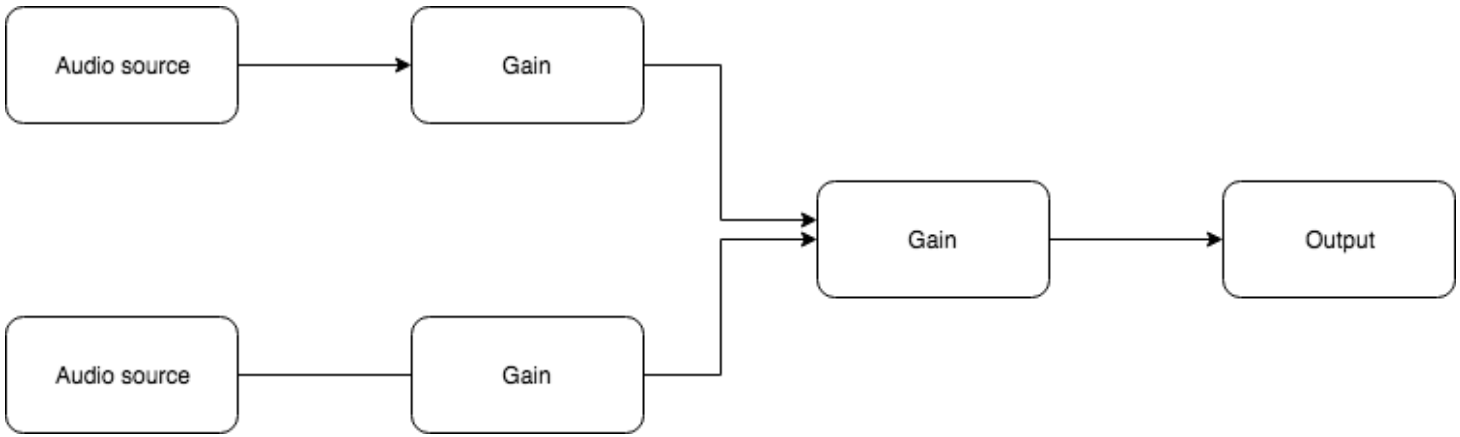
```
debugger;
```

The Node Graph



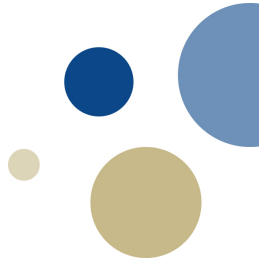
- The Web Audio API node graph has been designed inspired by the sound mixer metaphor.
- The node graph can also be related to the modular synthesizer metaphor (LittleBits, Reactable, MaxMSP or Pd).
- It is possible to create signal chains with the different objects.
- These objects are called nodes and are connected using the method $\mathrm{connect}()$.
- It is possible to place any node anywhere you want in the node graph signal chain.

Gain Node



- The gain node can be used to split and combine input sources.
- Gain nodes facilitate independent volume control of the audio sources.
- Gain nodes are used as virtual mixing channels.

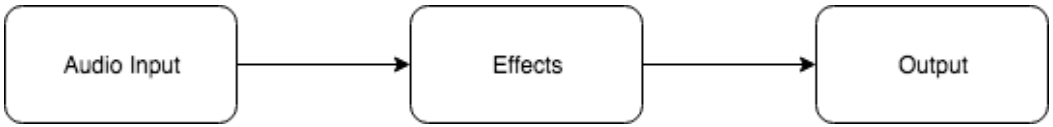
Modification Nodes || Effects Nodes



— There exist a number of effects nodes in Web Audio (panning, EQ, delay...).

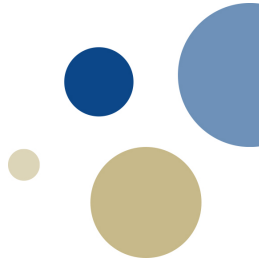
— It is possible to combine different or similar nodes (e.g. multiple effects).

How can the effects nodes be incorporated in the node graph?



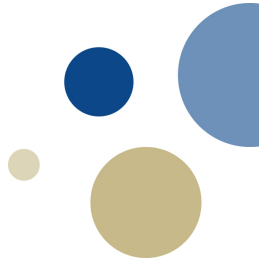
1. Invoke the method to create the node e.g. $\mathrm{AudioContext.createGain()}$.
2. Connect the object in the signal chain.
3. Modify the properties and methods of the effects node.

Some of the Effects Available



— GainNode: Volume change.
— StereoPannerNode: 2D panning.
— BiquadFilterNode: EQ filter.
— DelayNode: Audible delay.
— ConvolverNode: Convolution reverberation.
— DynamicsCompressorNode: Dynamic range compression.

GainNode

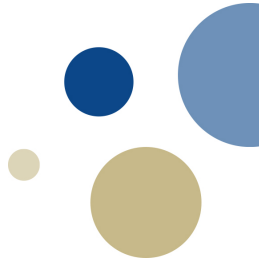


The GainNode changes the volume. Gain nodes are also used as virtual mixing channels that can be connected in parallel or in series.

```
AudioContext.createGain();
GainNode.gain // range: 0–1
```

https://developer.mozilla.org/en-US/docs/Web/API/GainNode

StereoPannerNode



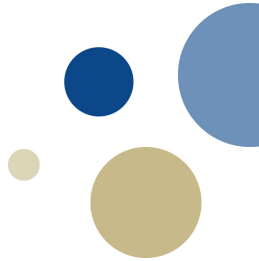
The StereoPannerNode can be used to pan an audio stream left or right.

```
AudioContext.createStereoPanner();

StereoPannerNode.pan // range: -1 (L) / 1 (R)
```

https://developer.mozilla.org/en-US/docs/Web/API/StereoPannerNode

BiquadFilterNode

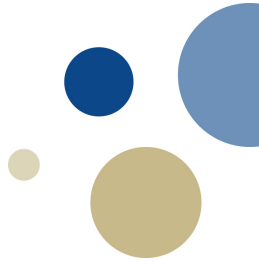


The BiquadFilterNode represents different kinds of filters, tone control devices, and graphic equalizers.

```
AudioContext.createBiquadFilter();
BiquadFilterNode.type // options: "lowpass", "highpass", "bandpass"...
```

https://developer.mozilla.org/en-US/docs/Web/API/BiquadFilterNode

DelayNode

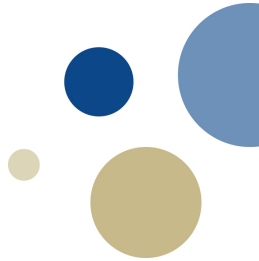


The DelayNode causes a delay between the arrival of an input data and its propagation to the output.

```
AudioContext.createDelay();
DelayNode.delayTime // range: 0-180 seconds
```

https://developer.mozilla.org/en-US/docs/Web/API/DelayNode

ConvolverNode



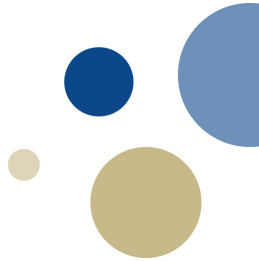
The ConvolverNode is often used to achieve a reverb effect.

AudioContext.createConvolver();

ConvolverNode.buffer

https://developer.mozilla.org/en-US/docs/Web/API/ConvolverNode

DynamicsCompressorNode

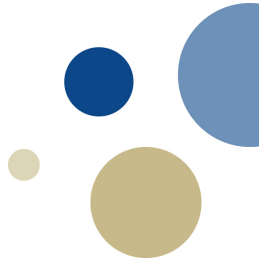


The DynamicsCompressorNode provides a compression effect. It lowers the volume of the loudest parts of the signal in order to help prevent clipping and distortion.

```
AudioContext.createDynamicsCompressor();
```

https://developer.mozilla.org/en-US/docs/Web/API/DynamicsCompressorNode

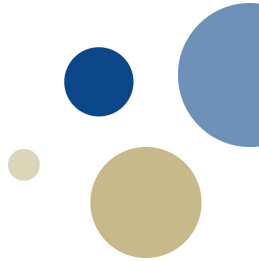
Mini-project development



You are expected to create a mini-project that should be doable within a week. The overall aim is to get familiar with Web Audio. Here are different approaches that you can take:

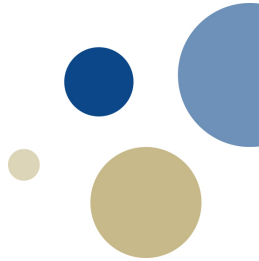
- Develop an idea based on what we are seeing in class. Feel free to build up everyday, or change if not convinced.
- Adapt an existing code to your needs and document what are the changes.
- Other?

Working style



- Individual work but in shared rooms. You are encourage to share and discuss with your peers.
- One-to-one talks via Zoom or personally with the instructor to catch up.
- There will be 4 time slots during the week to work on the project. It is OK to change the topic over the course of the week. Keep a research journal.

Relevant Links



— Syllabus: `https://uio.instructure.com/courses/17406/pages/syllabus`

— GitHub slides & code: `https://github.com/axambo/audio-programming-workshop`