<: COMPOSING A WEB OF APPLICATIONS USING FAUST :>

Turn the Web into a gigantic reservoir of audio components that can be combined and redeployed indefinitely

Faust - The Language

Faust [Functional Audio Stream] is a functional, synchronous, domain-specific programming language specifically designed for real-time signal processing and synthesis.

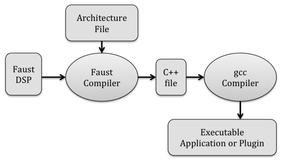
Faust is fully compiled and works at sample level.

Example of white noise:

```
random=+(12345)~*(1103515245);
noise = random/2147483647.0;
```

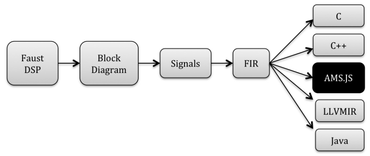
Faust Compilation Chain

The Faust language is as much as possible free from implementation details. It is the role of the *architecture file* to describe how to relate the DSP to the external world.



faust 'classical' compilation chain

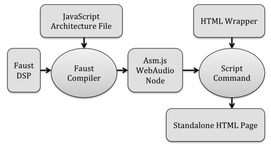
Faust2 development branch uses the FIR representation, which can be translated into several output languges. The different backends can be targeted passing options to the Faust compiler.



faust2 compilation chain and its multiple backends

Faust2WebAudioAsm Script

A script called faust2webaudioasm executes every step of the compilation to go from the DSP specification to the resulting HTML page.



faust2webaudioasm - from faust code to HTML page

By targeting the ams.js backend of the Faust Compiler, the DSP is compiled into an asm.js module (typed subset of Javascript, highly optimized in recent browsers). It is then wrapped with the Javascript architecture file to produce a fully working 'ScriptProcessorNode' of the Web Audio API.
Finally, an HTML wrapper is added, to create the resulting standalone page.

The WebAudio API

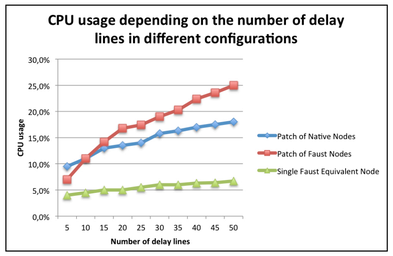
The Web Audio API specification describes a high-level JavaScript API for processing and synthesizing audio in Web applications. The processing is usually executed in the underlying implementation (typically optimized Assembly/C++ code) for natives nodes, but direct JavaScript processing and synthesis is also supported through the ScriptProcessor Node.

The JavaScript 'ScriptProcessorNode' is the interface given to developers to add new low level DSP capabilities.

Performances

A benchmark has been carried out, differentiating various configurations :

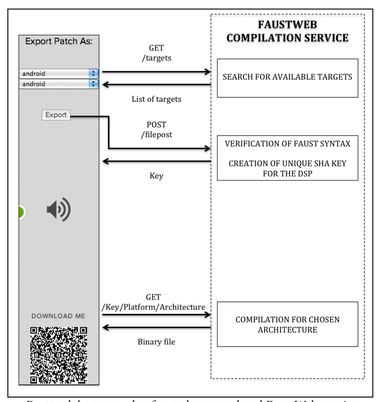
- A patch of Native Nodes
- A patch of Faust Nodes
- A unique equivalent Faust Node



Benchmark for a rebond algorithm in various configurations
Tested on OSX 10,6,8 - Chrome 39.0.2171.95

Faust Web

FaustWeb is a compilation service available on a browser and accessible from other applications like the Faust Playground. FaustWeb uses Faust 'static' compilation chain through scripts, like ***faust2webaudioasm***.



Protocol between the faust playground and FaustWeb service

libfaust.so

The Faust compiler, written in C/C++ has been packaged as an embeddable library called libfaust, published with an associated API, allowing users to embbed the Faust Compiler in their applications.

Create libfaust.js

Using Emscripten, it was possible to compile the Faust compiler itself in pure JavaScript, allowing users to embed it in their Web Pages

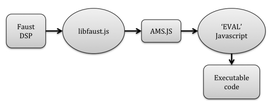
Creation of libfaust.js

Emscripten

Emscripten is an LLVM to JavaScript compiler. Using Emscripten, you can compile C and C++ code into JavaScript.

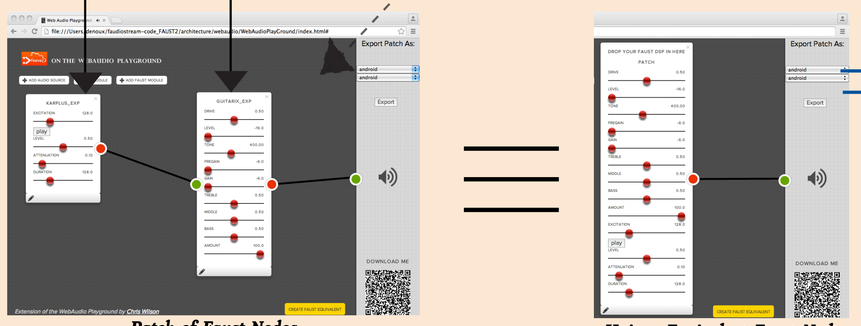
Embbeding libfaust.js

FaustPlayGround embbeds libfaust.js to compile Faust Code within the page.



Compilation chain embbed in 'Faust on the WebAudioPlayGround'

Faust Applications Deployed as HTML Pages

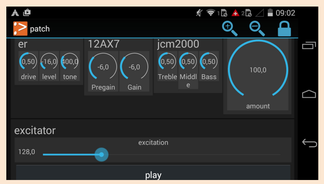


Patch of Faust Nodes

Unique Equivalent Faust Node

FAUST ON THE WEBAUDIO PLAYGROUND

Faust-Android Application



MAIN IDEA

The fundamental idea of this project is to explore the concept of freely combining/composing real-time audio applications deployed on the Web using Faust audio DSP language.

IMPLEMENTATION

The result of this project is 'Faust on the WebAudio Playground', a tool to compose Faust Programs (as files, strings or urls), edit and export your patches.

http://faust.grame.fr/faustplayground

Try Out Online Applications

ABOUT US

Sarah DENOUX
Stéphane LETZ
Yann ORLAREY
Dominique FOBER

http://faust.grame.fr
http://grame.fr