The *MOD Duo* as a Platform for Audio Programming

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Outline

The *Duo* Device

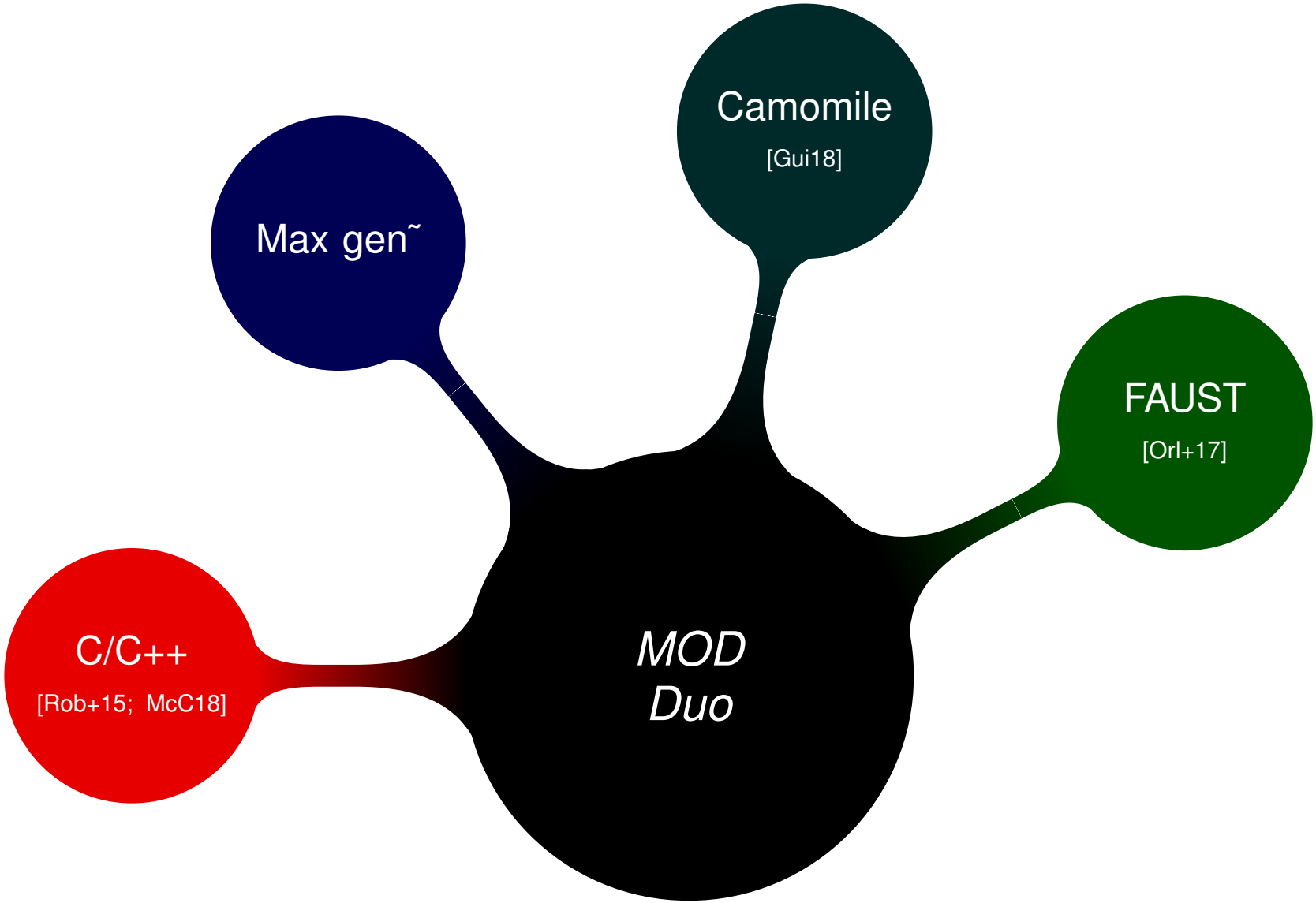
Cross-Compiling Plug-ins

Slides are online:
`https://github.com/jkbd/noise/`

The *Duo* Device

- 2 inputs, 2 outputs
- 2 encoders, 2 footswitches
- stand-alone LV2 host
- ARM Cortex A7, 912 MHz.

Where do the Plug-ins come from?



Fast-Forward: Build and Deploy

- TODO: Insert 5 slides of painstaiking preparation here
- Cross-compile package to LV2 bundle

```
D> ./build the-package-name
```

- Deploy LV2 bundle to *Duo* via HTTP

```
> cd ~/plugins/
> tar cz the-bundle-name.lv2 | base64 | \
curl -F 'package=@-' http://192.168.51.1/sdk/install
```

Prerequisite: Example LV2 Plug-in

- Noise

```
> git clone https://github.com/jkbd/noise
> cd noise
> cat noise.dsp
import("stdfaust.lib");
process = no.noise;
```

  - Valid TTL metadata.
  - Makefile honors `PREFIX` and `DESTDIR`.
  - Makefile calls `$(CXX)`, not `g++`!

Prerequisite: *Buildroot* Package

- Clone MOD Plug-in Builder

```
> git clone \
git@github.com:moddevices/mod-plugin-builder.git
```

- Create `noise.mk` file for the example

```
> cd ~/mod-plugin-builder/plugins/package/
> mkdir noise
> cd noise
> nano noise.mk
```

with the following contents...

Prerequisite: *Buildroot* Package (continued)

```
NOISE_VERSION = 1aebb5df94a9971a2fdbb91b6e7a70e6db72257a
NOISE_SITE = $(call github,jkbd,noise,$(NOISE_VERSION))
NOISE_BUNDLES = noise.lv2
NOISE_TARGET_MAKE = $(TARGET_MAKE_ENV) \
    $(TARGET_CONFIGURE_OPTS) $(MAKE) NOOPT=true -C $(@D)

define NOISE_BUILD_CMDS
  $(NOISE_TARGET_MAKE)
endef

define NOISE_INSTALL_TARGET_CMDS
  $(NOISE_TARGET_MAKE) install \
      DESTDIR=$(TARGET_DIR) PREFIX=/usr
endef

$(eval $(generic-package))
```

Prerequisite: Docker

- Docker installed
  It will save you from dependency hell
- MOD Plug-in Builder Docker image
  Contains *Buildroot* cross-compile toolchain

```
> mkdir ~/plugins
> docker run --privileged -ti \
-v ~/mod-plugin-builder:/home/builder/mod-plugin-builder \
-v ~/plugins:/home/builder/mod-workdir/plugins \
moddevices/mod-plugin-builder
D> exit
```

Install FAUST inside Docker Container

- Start Docker

```
> docker start -i priceless_hodgkin
```

- Install FAUST with dependencies

```
D> sudo apt-get update
D> sudo apt-get install cmake lv2-dev libboost-all-dev
D> git clone https://github.com/grame-cncm/faust.git
D> cd faust
D> git submodule update --init
D> make
D> sudo make install
```

Again: Build and Deploy

- Cross-compile package to LV2 bundle

```
D> ./build noise
...
Finished copying noise.lv2
D> ls ~/mod-workdir/plugins/noise.lv2
manifest.ttl  noise.so  noise.ttl     # yeah!
```

- Deploy LV2 bundle to *Duo* via HTTP

```
> cd ~/plugins/
> tar cz noise.lv2 | base64 | \
curl -F 'package=@-' http://192.168.51.1/sdk/install
```

Where to get help

- MOD Wiki `https://wiki.moddevices.com/wiki/Creating_Audio_Plugins`
- Explore the packages in MOD Plug-in Builder

Summary

Contents

- The *MOD Duo* device
- Cross-compile a FAUST based LV2 plug-in

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If you have a *Duo*, try out:

- Peak Limiter `co.limiter_1176_R4_stereo`
- Moog Voltage Controlled Filter `ve.moog_vcf`
- Harmonic Exciter `dm.exciter`
- Bart Brouns Compressors
  `https://github.com/magnetophon/faustCompressors`

References I

[Gui18] Pierre Guillot. *Camomile: Creating audio plugins with Pure Data*. 2018. URL: http://lac.linuxaudio.org/2018/pdf/44-paper.pdf (visited on 11/29/2018).

[McC18] Mark McCurry. *Introduction to LV2. A Plugin Host Perspective*. 05/06/2018. URL: http://fundamental-code.com/tmp/lv2-host-perspecitive.html (visited on 11/29/2018).

[Orl+17] Yann Orlarey et al. *FAUST Quick Reference*. Version 0.9.100. Centre National de Création Musicale. 06/07/2017. URL: http://faust.grame.fr/images/faust-quick-reference.pdf (visited on 08/09/2017).

[Rob+15] David Robillard et al. *Programming LV2 Plugins*. 04/08/2015. URL: http://lv2plug.in/book/ (visited on 11/29/2018).

Questions?

(My name is Jakob Dübel)