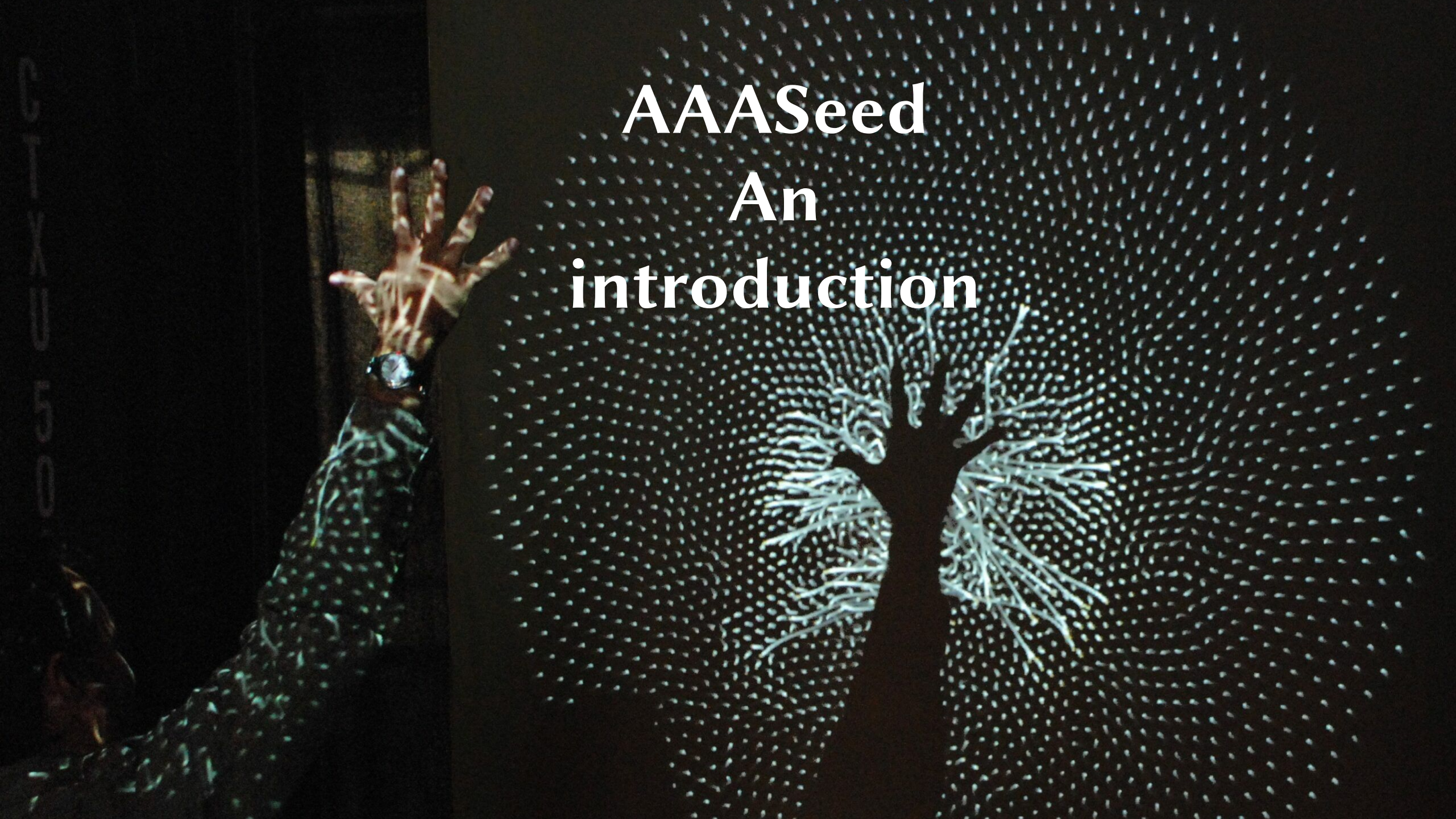
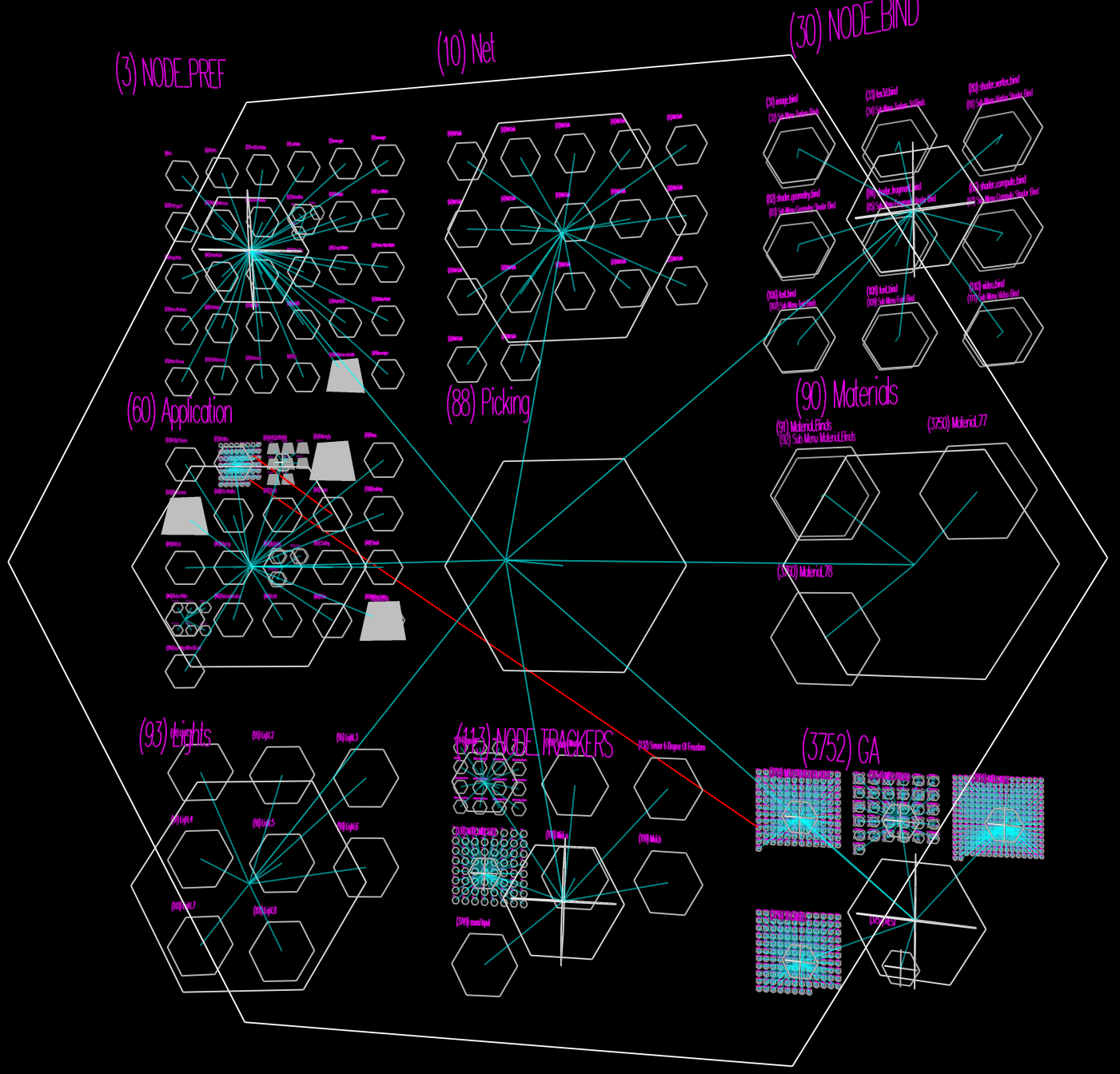


AAASeed
An
introduction

- # AAASeed
  # An introduction
  # Part 1:
  # What is AAASeed

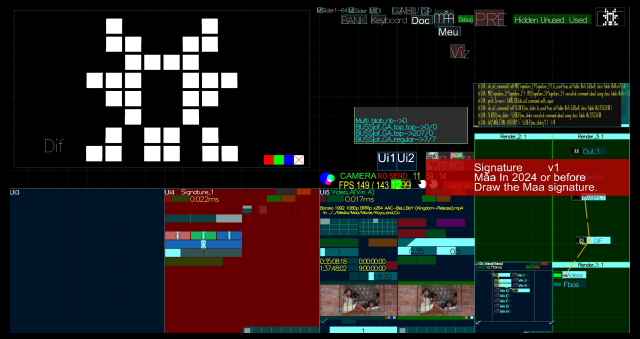
- What is AAASeed
- Who is AAASeed for ?
  - **Artist**
  - **CCI**
  - **Developer**
  - **Education, Hobby**
- User point of view
- Shadoks point of view
  - **Ga Bu Zo Meu**



What is AAASeed ?

- **AAASeed** is a **powerful, generic toolkit**
  for building real-time processes,
  creating immersive, high-performance, interactive visual experiences.
- **AAASeed** is **designed** for **creative professionals and enthusiaststt.**
- **AAASeed** is **focused on**
  - **Video Jockeying & Live Mapping**
  - **Open Data Visualization**
  - **Interactive Art installations**
- **AAASeed** is the result of **25 years of real-world use and refinement,**
  created by **Mâa Berriet** with significant help from **Franz Hildgen.**
- **It** will soon be **available as a free, open-source tool under the MIT license.**
- **Stabilized and improved through an European Project**
  ArtCast4d.eu
  Early Adopters Program
- **AAASeed is build to last**
  AAASeed.org

Who is AAASeed for?
Artist



- **Create live, graphic and interactive artworks.**
- **Build** and **assemble** blocks on the **fly.**

  Most blocks handle **graphics processes.**

  Others can manage anything, for example:

  input (cameras, sensors)

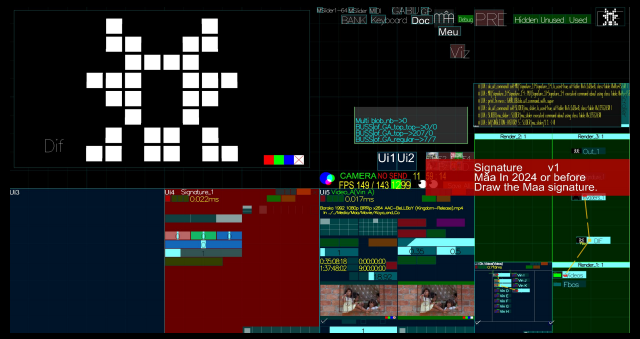
  Image analysis

  Connections between elements

  ...
- **Free License**

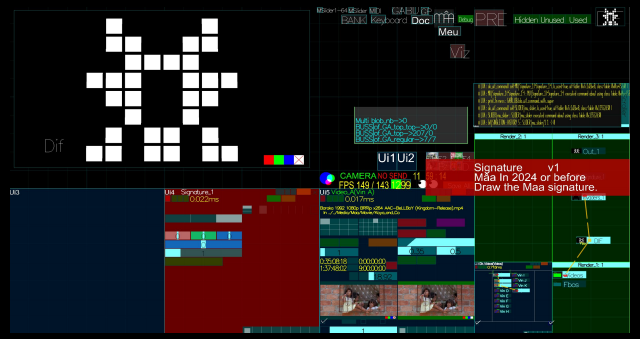
  free digital support for generative/interactive artworks.

Who is AAASeed for?
Creative Cultural Industries



- Video professionals
  Control and display videos, images, and text.
- Immersive environments:
  Perfect for Multi-screen and multi-machine setups.
- Typical uses:
  - Live performance (dance, theater)
  - Broadcast(TV)
  - Digital signage, Interactive screens
  - And more...
- Seamless Integration: Works live with existing tools, including
  - Protocols: Spout, OSC, MIDI
  - Software: TouchDesigner, vvvv, Unity, Unreal, Chataigne, OBS studio...
  - Audio: Max/MSP, Ableton Live, PureData/PlugData...
- Free License
  Keep your budget focused on production.
  Long-term operational guarantee

Who is AAASeed for?
Developer

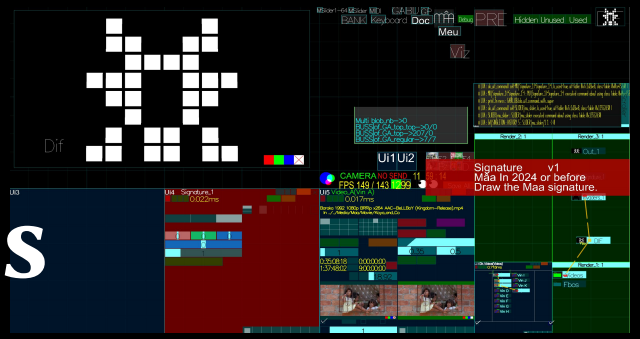


- **The core of AAASeed** is an old school **very robust C++ render graph.**
- **Lua**, the **very fast and flexible scripting** language pilots it and lets you can access the low level functionality:
  - **Window system**
  - **custom C++ and C object**
  - **OpenGl, Glsl Shaders, OpenCl**
  - **Libraries such as OpenCV, Nvidia Flex, dlib, bullet**
  - ...
- A rich **lua virtual machine provide**

  a flexible interface (Ui and code) for editing and customizing real-time processes.
- you can **extend and modify** the system's interface and behavior

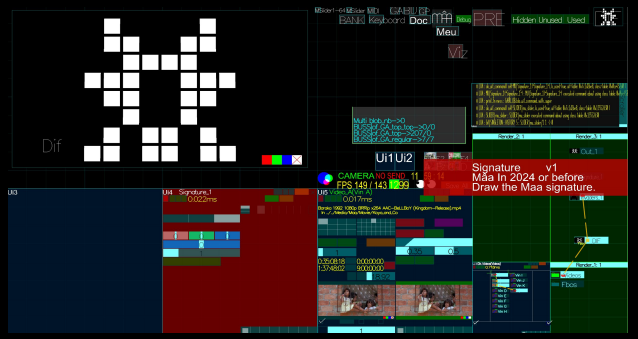
  on the fly, even while processes are running

Who is AAASeed for?
Students, Hobbyists, Teachers



- AAASeed is a rich, fast and complete tool for exploring graphics.
- Learn & Understand:
  Script and test 3D graphics ideas on the fly.
- Experiment:
  Dive into live coding, shaders, and advanced mathematics.
- Teach:
  Use it as a powerful teaching tool for coding and graphics.
- Research:
  Serves as a great infrastructure for research and development.
- Accessible:
  Easy to use and more powerful than Processing,
  more graphic primitives coming soon!

User point of view



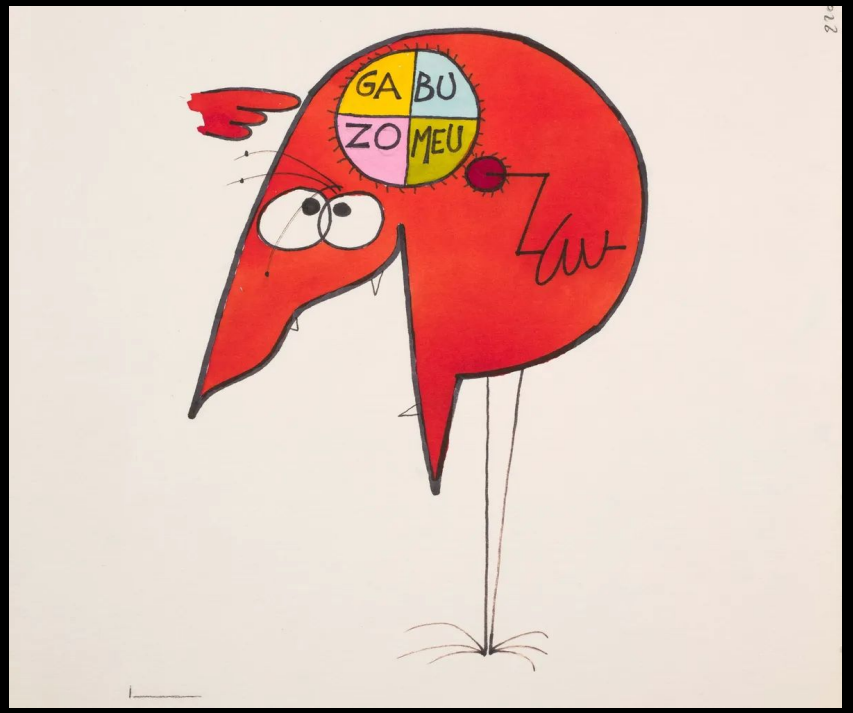
- This a W**indows** application for now
  AAASeed_Metal.exe
- Tested against **windows 10 and 11**
  but should also work on Windows 8,7 even XP.
- It can **run on low end machines**
  even an executable for non Avx2 Processor (AAASeed_Wood.exe)
- But it likes fast machines and **uses the GPU a lot**
  GPU means **G**raphic **P**rocessor **U**nit (the Graphic card)
  Loves NVidia but **functions on integrated Intel**
  supports Amd most of the time (getting better on Amd every month)

Shadoks point of view

"In case of problem just pump"

- AAASeed have heritage
  - a playful nod to "Les Shadoks," a classic French animated series.
    - More on this: search Shadoks on YouTube
      - www.youtube.com/watch?v=Sla57Zw-FN4
    - Thanks to aaaproduction (www.aaaproduction.fr)
- You are about to enter another world: welcome
  - if it can look weird at the beginning
  - It will make sense
    - it have its own logic
    - It have being tested in the real world
      - by very different users
      - in a wide range of conditions

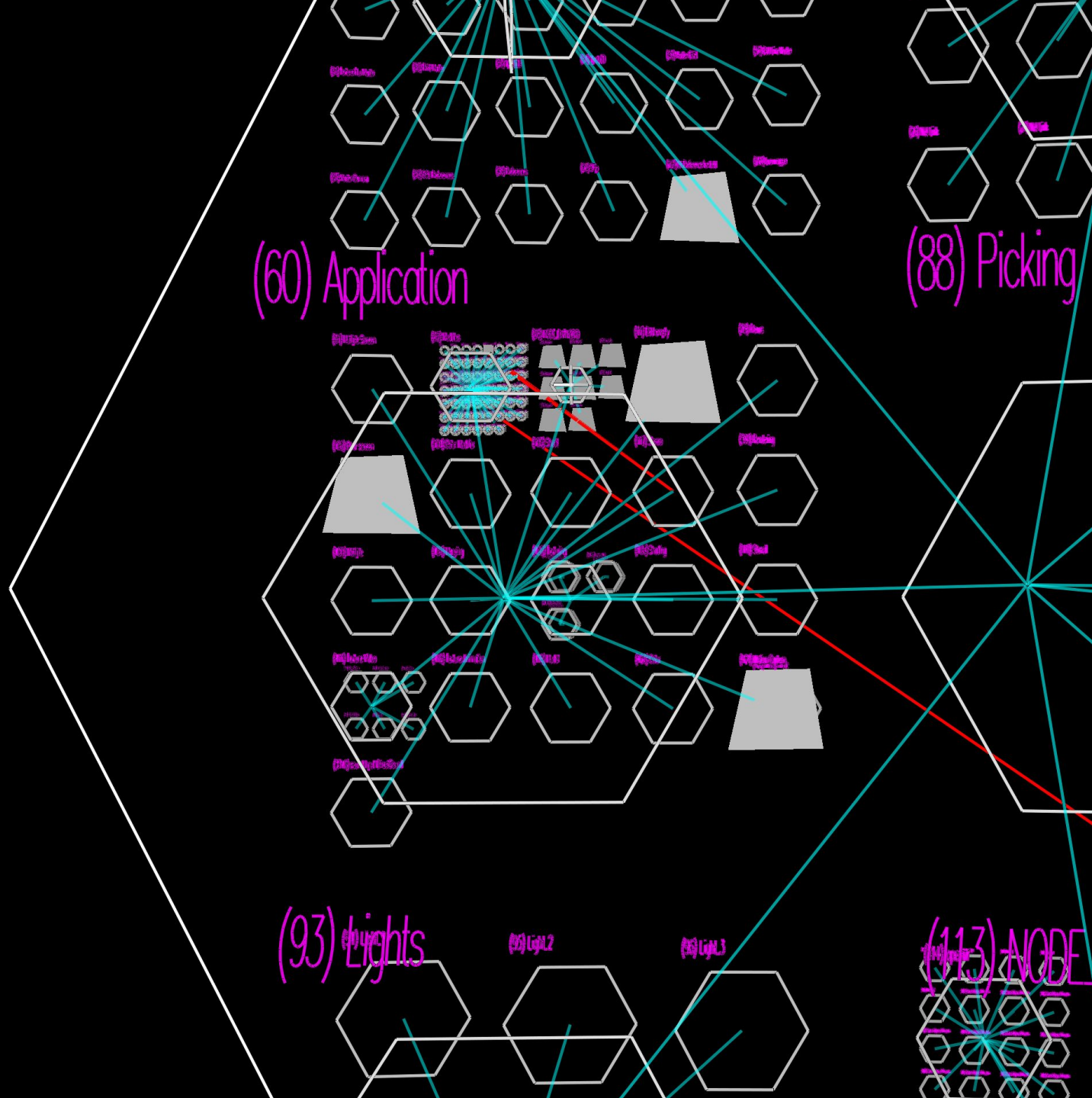
Shadoks point of view
Ga Bu Zo Meu



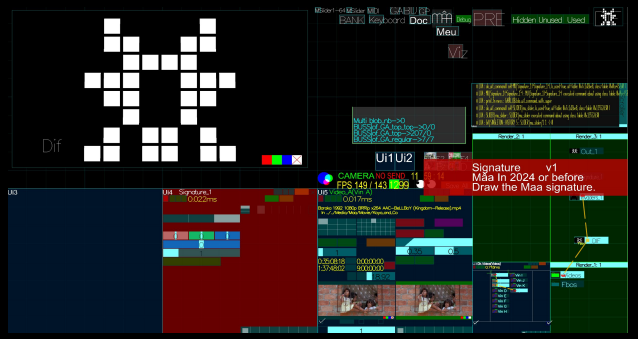
- **New world, New vocabulary**
  - **Avoid confusions with existing concepts**
  - **Simple and Compact (shorter code and sentence)**
- **GA**: **G**lobal **A**ction
  - is the **top level** of the system
- **BU: B**ox **U**ser
  - are the basic **element of the Ui (User interface)**
    - button, slider, text...
  - **BUs** are **regrouped in BUS** (a group of BU)
  - **a BU** can contain a **BUS**
    - this way a BU can contain other BUs to compose a more complex Ui
- **MEU: M**odule **E**ditable **U**nit
  - **functional editable blocks**
    - the **AAASeed atomic blocks** to build your processes
  - can be represented in their short form the **MU: M**odule **U**nit
  - **BUS** and **BU** are used to define the **MEU Ui**
- **ZO**: We lost the **ZO**
  - «On a perdu les ZOs»: but we will find it, promised

AAASeed
An introduction
Part 2:
Installation

- OS and machine
- Installation
  - **Required software**
  - **Other software**
  - **AAASeed / File structure**
  - **Multiscreen**
- First Launch & Basic Controls
- Trouble shooting
- AAASeed Folder
- AAASeed Sources



OS and machine



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  GPU means **G**raphic **P**rocessor **U**nit (the Graphic card)
  Loves NVidia but **functions on integrated Intel**
  supports Amd most of the time (getting better on Amd every month)

Installation 1/4: Required software

- To run **AAASeed**, you need to i**nstall a few essential applications first**:
  - **Klite Codecs**
    Decompresses video files. **AAASeed** uses it for video playback (through DirectShow)
    www.codecguide.com/download_kl.htm
      we use klite Mega, but other options should function too
    Use the default installation options.
  - **7z**
    Compresses and decompresses .7z files, which **AAASeed** uses for updates
    www.7-zip.org
      Get the 64-bit x64 version
    Run the downloaded executable.
  - **Visual Studio Code**
    This is the default text and code editor for AAASeed
    code.visualstudio.com
      Get the Windows version
    Run the installer
      Install extensions for Lua, GLSL, and OpenCL syntax highlighting
      For best results, open your entire AAASeed folder as a workspace to easily search and find files
        open AAASeed_VSCode.code-workspace is one way to do this
      NotePad++ and Sublime Text 2/3 were used and should still function
        configure in Flatland at Pref/MASTER/Lua/lua_master/editor

Installation 2/4: Other software

- The following tools are **not required to run AAASeed** but are **highly recommended** for specific workflows:
  - **PureData and/or PlugData**

    Used for **running patches related to MIDI to OSC** (conversion and sound analysis).

    Needed to run patches in AAADoc/PureData:

    Midi to OSC

    Sound analysis to OSC

    puredata.info and/or plugdata.org
  - **XnView**

    An **image browser** with powerful **batch processing and conversion** capabilities.

    www.xnview.com/en/

    MP or Classic
  - **Wings3d**

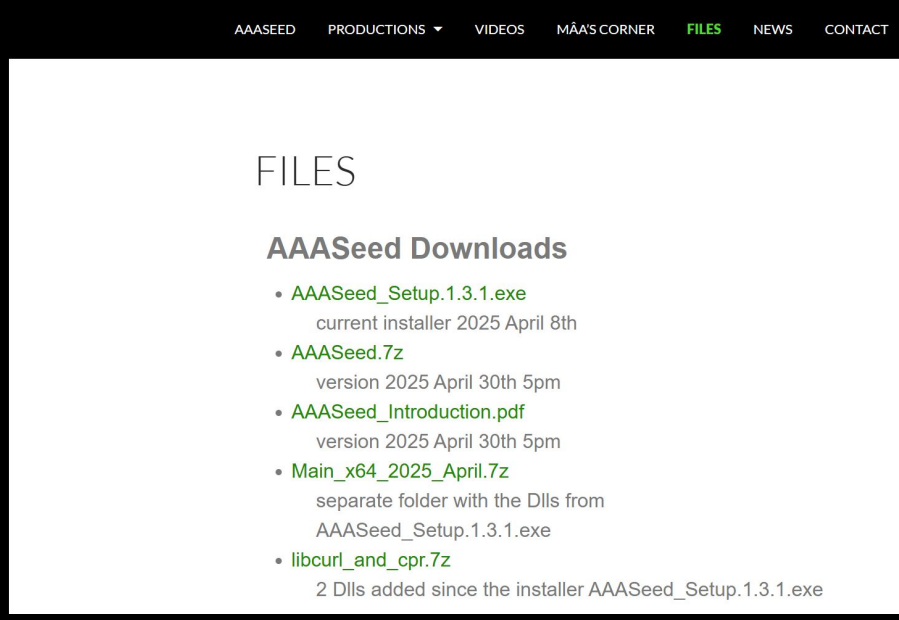
    A 3D modeler useful for exporting .obj files, derived from Symbolics/Nendo.

    www.wings3d.com
  - **Blender**

    The industry-standard open-source 3D editor.

    www.blender.org

Installation 3/4: AAASeed



- Download the latest files from **AAASeed.org/files**

  Run AAASeed_Setup.1.3.1.exe (or the latest version)

  A system reboot is required after the first installation.

  Download and add libcurl.dll and cpr.dll to AAADll Folder

  Update: There is no automatic updater yet.

  To update, download the latest AAASeed.7z file

  then replace your existing AAASeed folder with the new one

  You can rename previous or current AAASeed folders as you w
  keep different versions if you want

- **Understanding the general file structure**

-AAAFoundation **Stores all AAASeed-related content and your personal work.**

- **-AAADll** **Contains external software libraries (DLLs).**
  The installer adds a system path to this folder,
- **-AAASeed** This folder contains the core executables and code maintained by the AAASeed team.
  Do not save your personal work here.
- -**AAAUser** **Your user preferences are stored here.**
- **-APPs_Guest** This is where you should save your own applications (APPs).
- -**Media** **Place all of your content (videos, images, sounds, etc.) here.**
  Eventually use sub folder by projects
- -**Install** **Associated installers, drivers…**

- It is possible to install "manually" (no installer) from a local drive or USB Key

  Copy the folders and add the Dlls path to the User or System path

Installation 4/4: Multiscreen

AAASeed supports **up to 6 screens**

On **desktop**

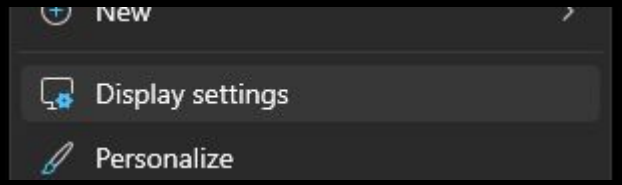
right click menu

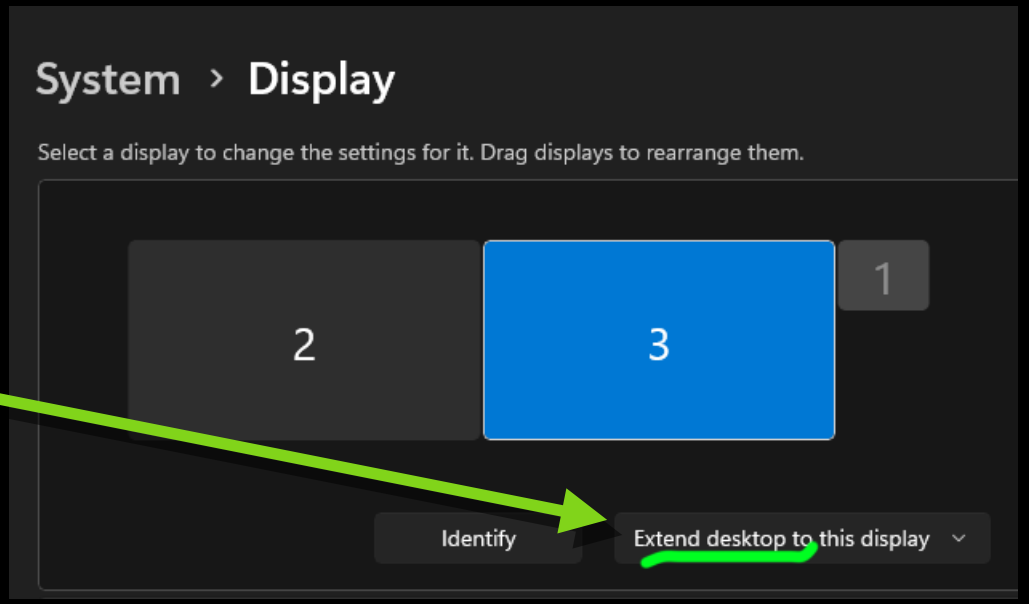
Display Settings item

Dialog

- Choose **Extend desktop** mode
- Be careful with the **screen alignment**

  Horizontal and Vertical
- Choose the **right resolution**

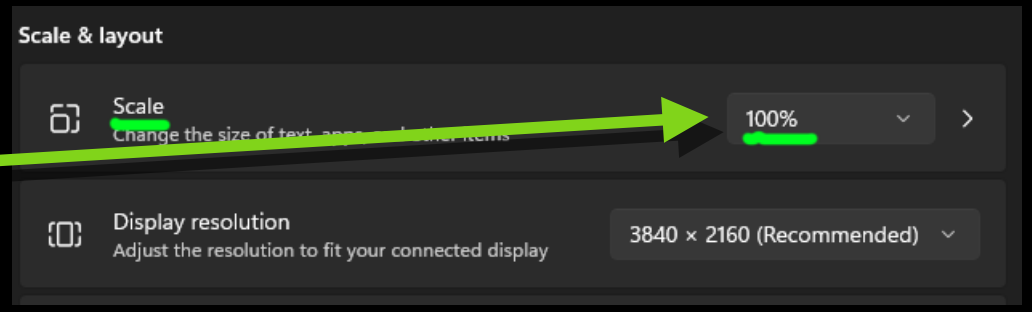




Note: Was mandatory before 2025 May

Scale all screens to 100%

seems ok now, testing



First Launch & Basic Controls

- Run

  Launch AAASeed_Metal.exe.

  For machines without AVX2 extensions, use AAASeed_Wood.exe.

  AAASeed_Metal.exe will crash with no message on these machines.

- Switching display modes:

  Press w → switches between windowed and full-screen mode.

  Press Tab → toggles the Flatland interface on and off.

  Press Ctrl E → enters edit mode
  indicated by a green lock at the top-left of Flatland.

- Exiting:

  Press Esc twice fast (Double Escape)

  → quits and save your global settings.

  Press Alt F4 or right-click the mouse and select Exit

  → quits without saving.

Trouble shooting (Archive)

- Missing DLLs:

  If you see a missing DLL error (other than a VC...dll file)

  you may need to add the AAADll folder to your system's environment variables:

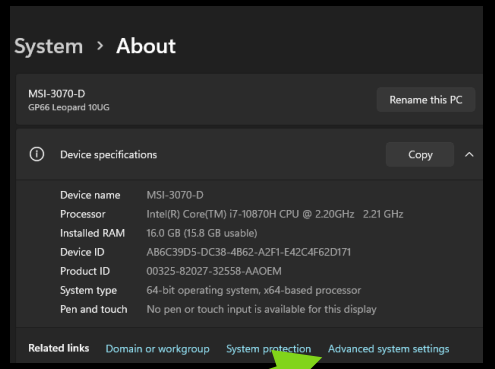
  Copy the Dll path from the folder where they are
  Go to PC / Properties / Advanced system settings
  Choose Environment Variables
  Choose User variable/Path (User or System) / Edit...
  Choose New
  Paste path and eventually change order
  Validate : Choose Ok then Ok then Ok
  Launch AAASeed_Metal.exe

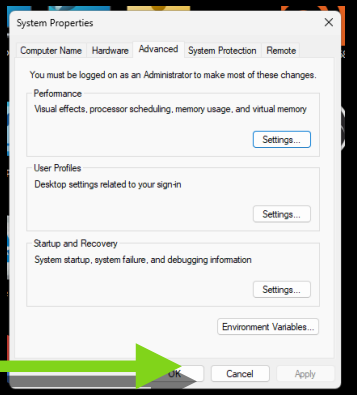
- Missing VC ... .dll

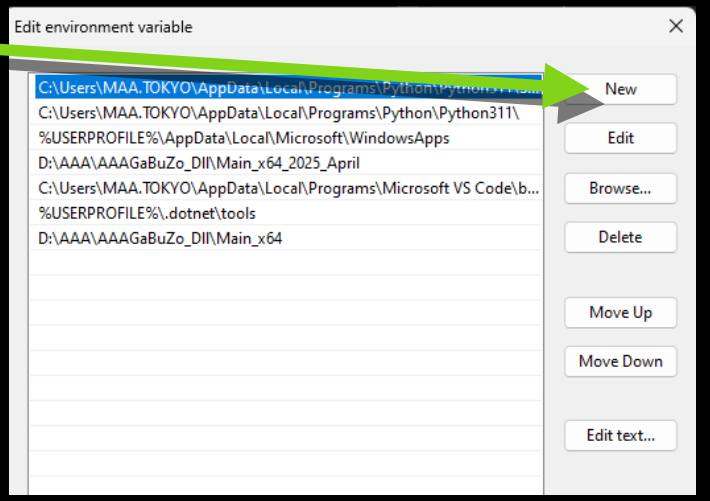
  Run the appropriate VC_redist_2015_2022...exe installer.

- Missing VCOMP120.dll

  Run vcredist_2013_x64.exe







AAASeed Folders: Inside

AAASeed folder name can be changed

- Users use this to keep different versions

We call it the start folder

- in lua aaa.dir.get_dir_start()

This is what we maintain and update

- As User/Guest don't store your stuff here
- For developers: this is the Git repository

2 executables

- AAASeed_Metal.exe
- AAASeed_Wood.exe for machine with no AVX2 Extensions
  AAASeed_Metal.exe just crash at start

3 files

- README.md
  Details the installation process and tree structure
  Document the start sequence
  Preview in VSCode
- ReleaseNotes.md
  Documents the the changes and new features from one version to the next.
- Version.txt
  A simple text file that shows the current version number of the installer.

AAASeed Folders: Folders inside

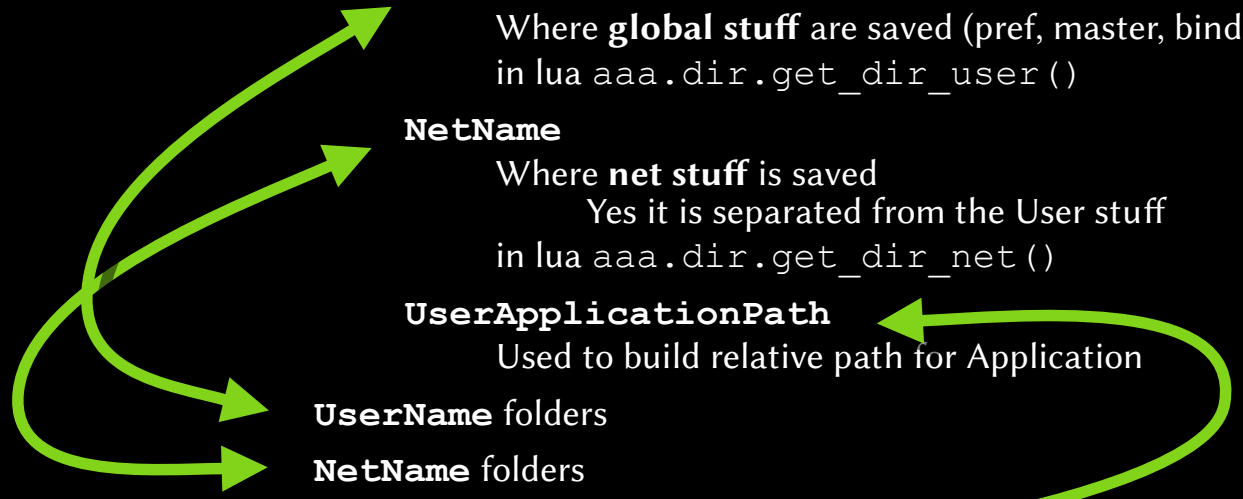
- **AAAAPPs** Folder
  - **APP** is like a document or project in AAASeed.
    An App ↔ A **folder** with a file **`default.layerss_param`** inside
    Examples, Tutorials...
    No way to save an APP for the moment: DUPLICATE FOLDER !!!
  - **Regroups APPS maintained by the core team**

- **AAADoc** Folder
  - stores the documentation. Far from finished (state in 2025 May)
  - **Lua** API
    lua_aaaseed_draw.lua
    lua_aaaseed_interface.lua

- **AAAKernel** Folder
  - **this Developer space contains core resources for AAASeed**
    lua code, shaders, OpenCl, Fonts, Textures...
  - in lua `aaa.dir.get_dir_kernel()`

AAASeed Folders: going Up

- **AAASeed** the Startup folder (where the executable starts)
  in lua `aaa.dir.get_dir_start()`
- **AAAUser** folder
  - **`AAAWho.txt`** made of **3 lines:**
    `UserName`
    Where **global stuff** are saved (pref, master, binds...)
    in lua `aaa.dir.get_dir_user()`
    `NetName`
    Where **net stuff** is saved
    Yes it is separated from the User stuff
    in lua `aaa.dir.get_dir_net()`
    `UserApplicationPath`
    Used to build relative path for Application
    `UserName` folders
    `NetName` folders



- **APPs_User** folder
  - **APPs_Guest** by default
    Your APPs, MEU protos, data, shaders.....
- **Media** folder
  - images, videos, fonts, 3d objects...
  - **Big** files are there

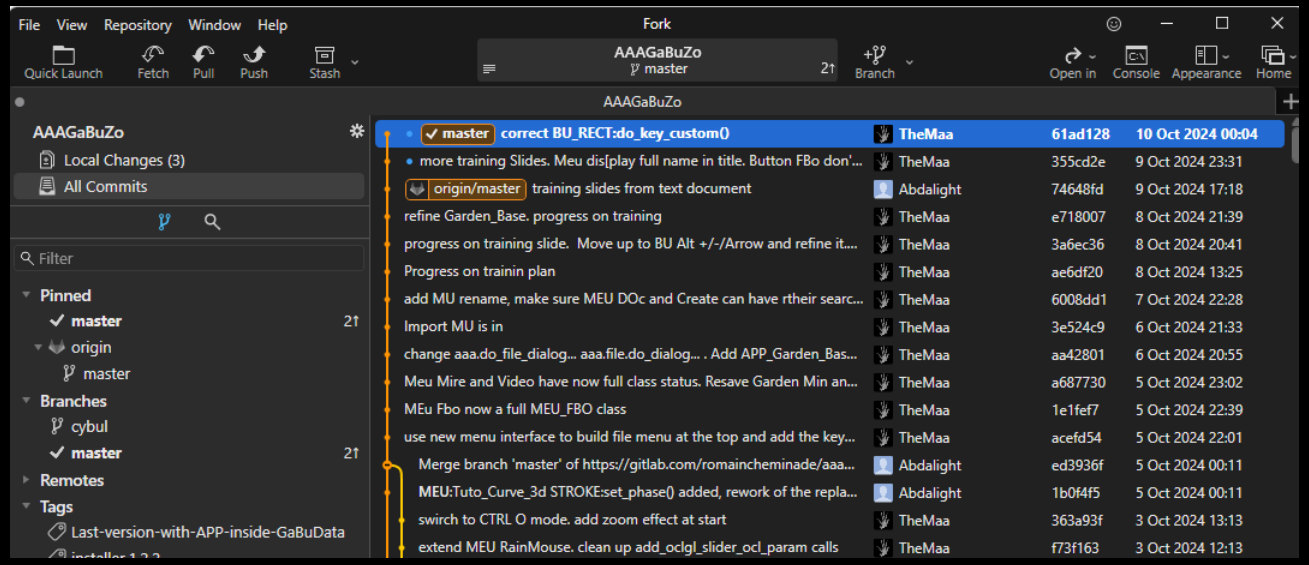
AAASeed Sources

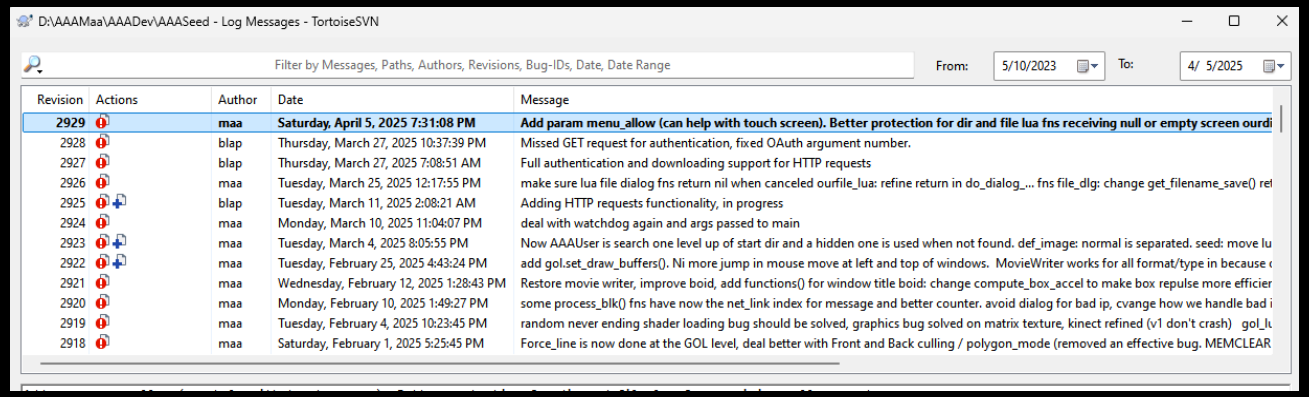
- **AAASeed.org**

  FILES section

- **Developer access**
  git
  -**AAASeed Folder**
  -Lua
  -APPs
  Svn
  -**AAASeed.exe** and dll
  -C++
  -will move to a git

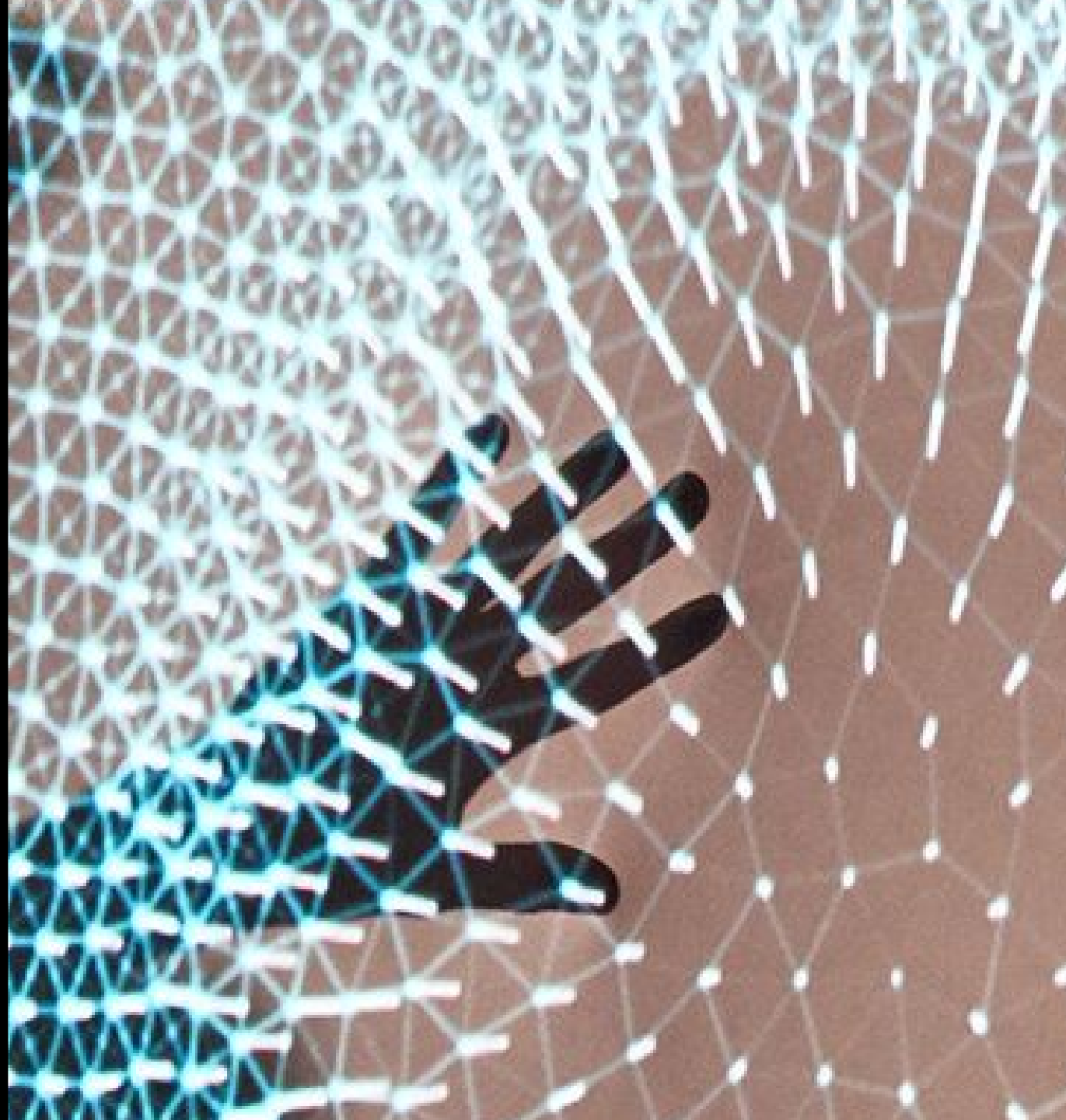
  request Mâa if you want it





AAASeed
An introduction
Part 3:
Baby steps

- **Update AAASeed**
- **First steps**
- **Flatland 101**
  - Example
- **Multi screen**
  - Flatland
- **Lua Error Dialog**
- **APPlications**

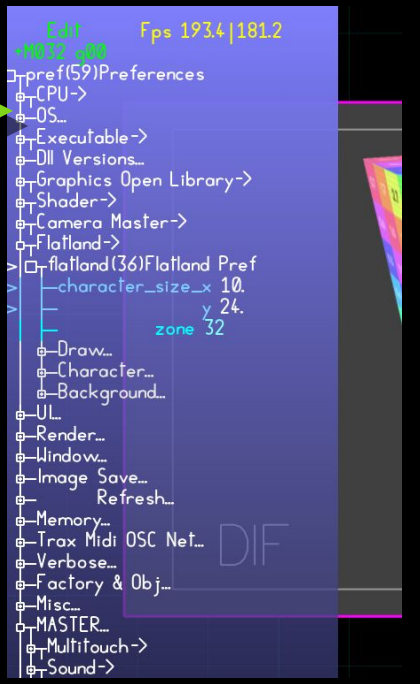


Update AAASeed

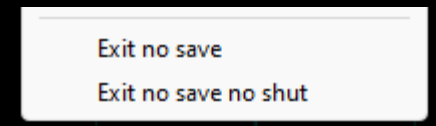
- Get AAASeed.7z
  - **AAASeed.org**
    - `FILES` section
    - Certain browser like Chrome (2025 July) block the download: see your browser security documentation
- Replace existing `AAASeed` Folder
  - Reminder
    - **you can rename `AAASeed` folders**
  - **current version (July 2025) needs 2 more dlls**
    - `libcurl.dll` **and** `cpr.dll`
    - Available also at `AAASeed.org FILES` section
    - Put it in `AAAFoundation/AAADll`

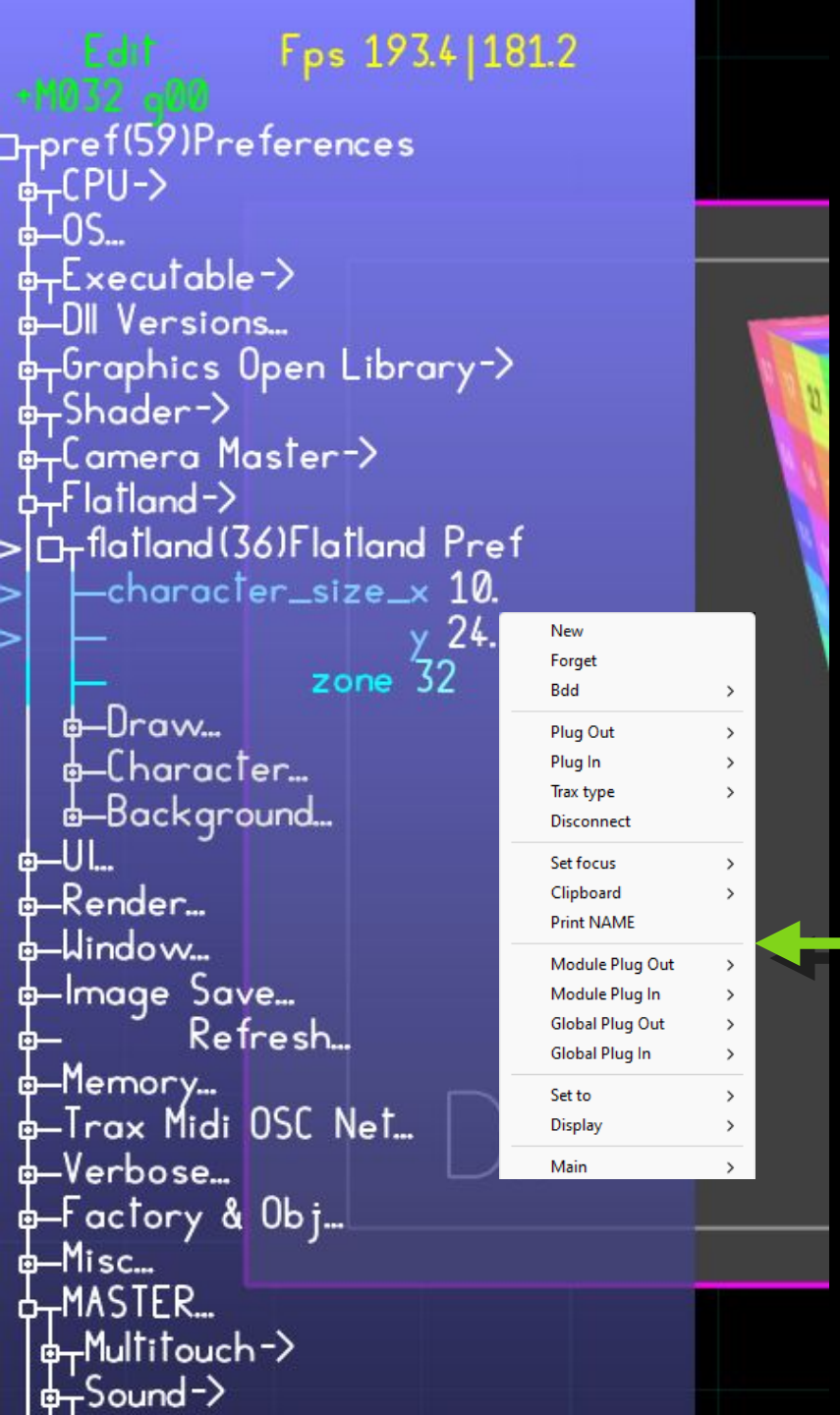
First steps

- **keyboard** first step
  - **w** like (**w**)indow →
    switch between window and full screen Module
  - **Tab → switch Flatland On and Off**
    Ctrl e → like (**e**)dit **flip edit mode** (more later on this)
    see feedback at the top left of Flatland
    Red LOCK **Green Edit**
    leave it as **Edit**



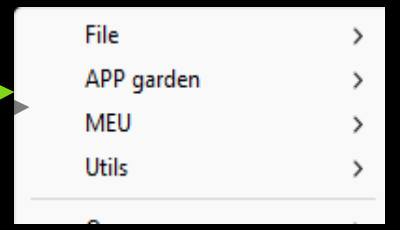
- **Quit, Exit ...**
  - **Double Esc →**
    Quit with saving global stuff
  - **Alt F4 or Mouse Right Button/Menu/Exit no save →**
    Quit without saving global stuff
    require a confirmation



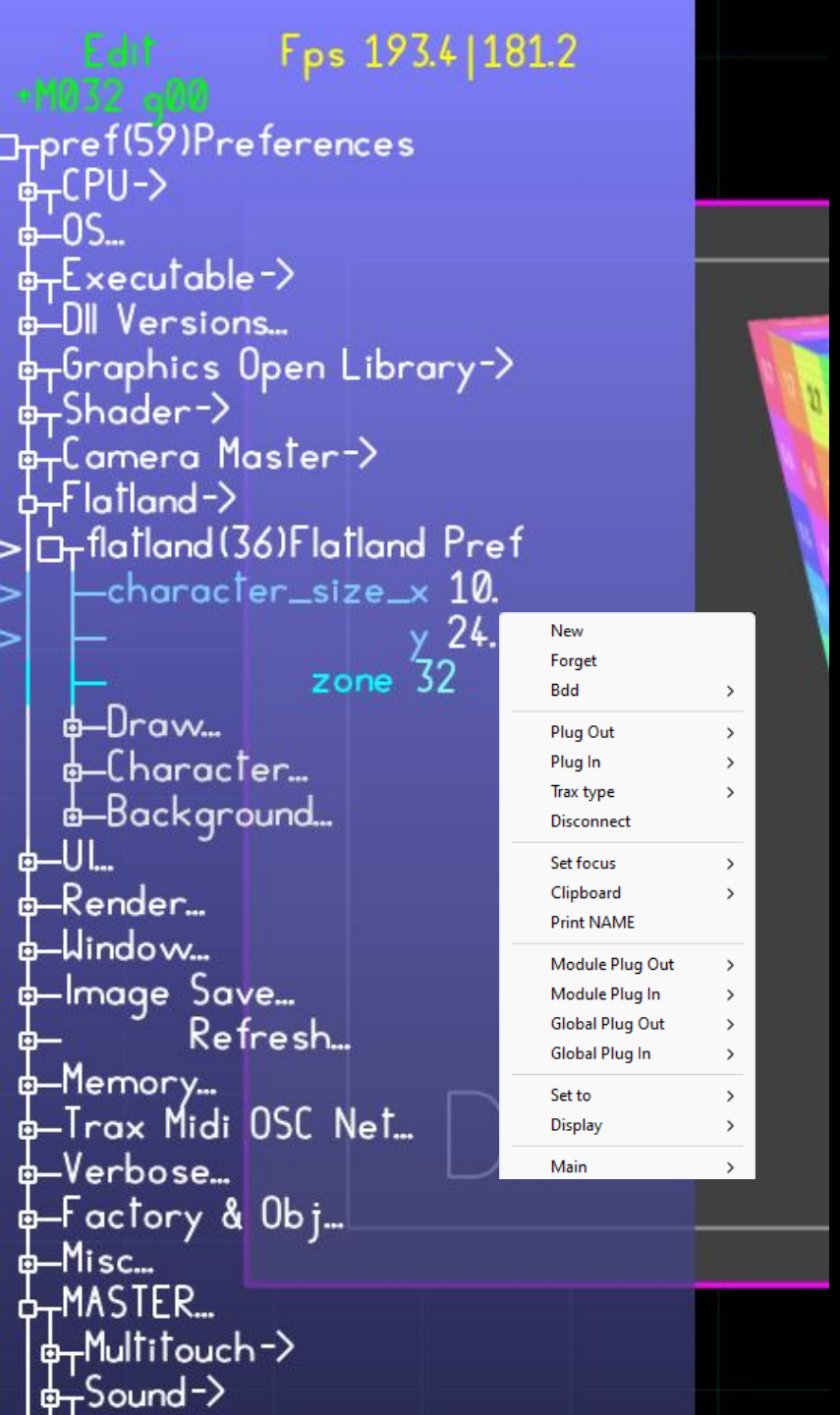


Flatland 101

- **Original AAASeed Ui** from previous century
  - **Name from « Snow Crash » book by Neil Stephenson**
  - where the **C++ can be seen and used**
  - made of **c_obj_ui and param** (for parameter)
  - Tree Made of params
    - developer will say render graph
    - a whole world we will explore later
- example: change values in Flatland (next slide)
- Keys
  - **Tab → switch Flatland On and Off**
  - **F10 → focus flatland on Preferences**
  - **Ctrl F10 → focus flatland on Preferences at start**
- **Right Mouse Button → Menu**
  - **in Flatland → Param menu**
  - **out Flatland → Main menu**
    - **GaBuZoMeu menu**
      - **Beginning of Main menu**



- **Flatland have precedence for events and keyboard**
- **Needs to be off to use keys with GaBuZoMeu**



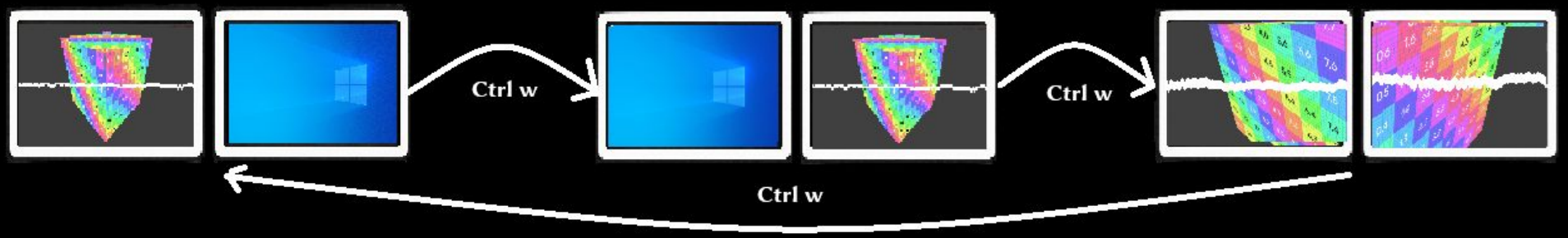
Flatland example

- **change values `character_size_x/y`**
  - **F10 → Preferences**
  - **Wheel → Scroll**
  - **Click (left Mouse Button) on `Flatland`**
    → select / open
  - **Click on `character_size_x`**
    maintaining the **mouse button down**
    then **turn around the starting point to change** the value
    release the mouse button
  - **Double Click**
    → open an **edit dialog**
  - **Keys + - * /**
    → change the value
  - **Ctrl z**
    → undo (only last change 2025 July)

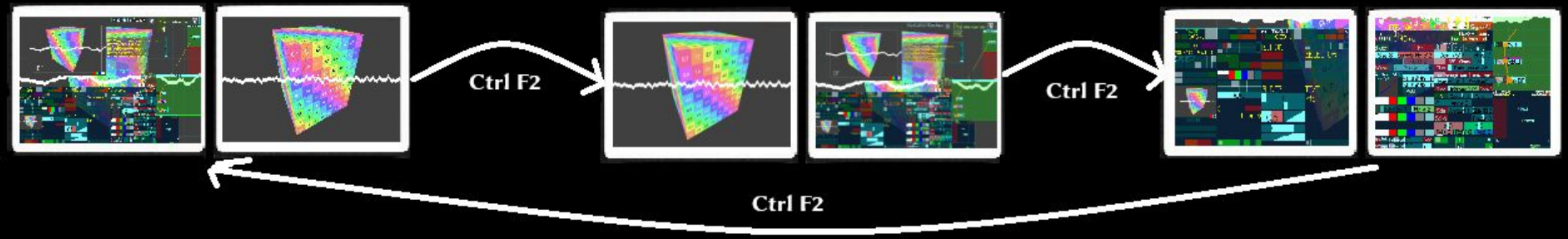
- **Reminder**
  Flatland have precedence for events and keyboard
  Needs to be off to use keys with GaBuZoMeu
  So leave it off for now → **Tab**

AAASeed and Multi screen

- **w** like (**w**)indow
  → **switch** between **window** and **full screen** Mode
- **Ctrl w** → **circle** through all the possible **full screen configurations**
  with **Shift** → **go the reverse way**



- **Ctrl F2** → **change UI position on screens**
  with **Shift** → **go the reverse way**



- Same principle applies with more screens (up to 6)

Multi screen and Flatland

- **Flatland by default on left**

  of AAASeed Window

  which can traverse several screens

- If it is a problem

  switch AAASeed window position

  See previous slide

  or change Flatland position

  Flatland (Tab)

  Preferences (F10)

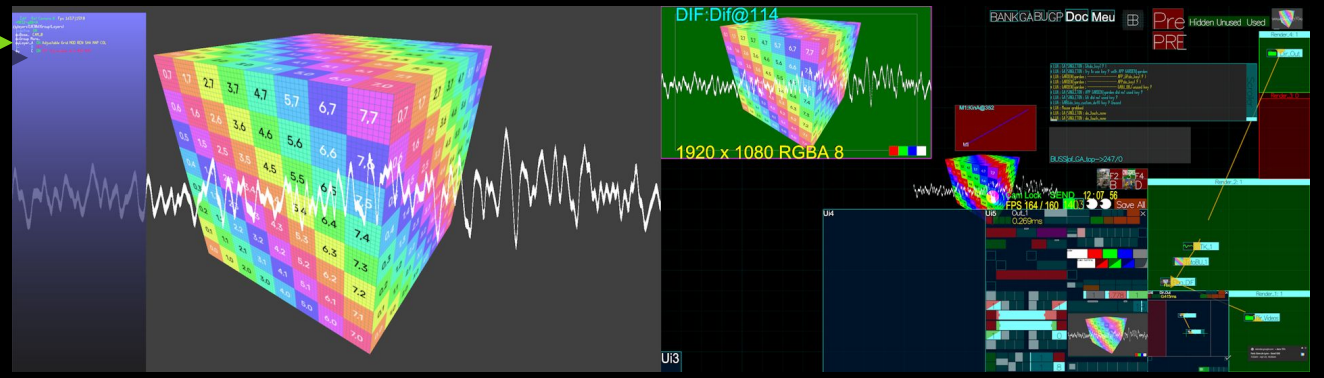
  Flatland/Draw

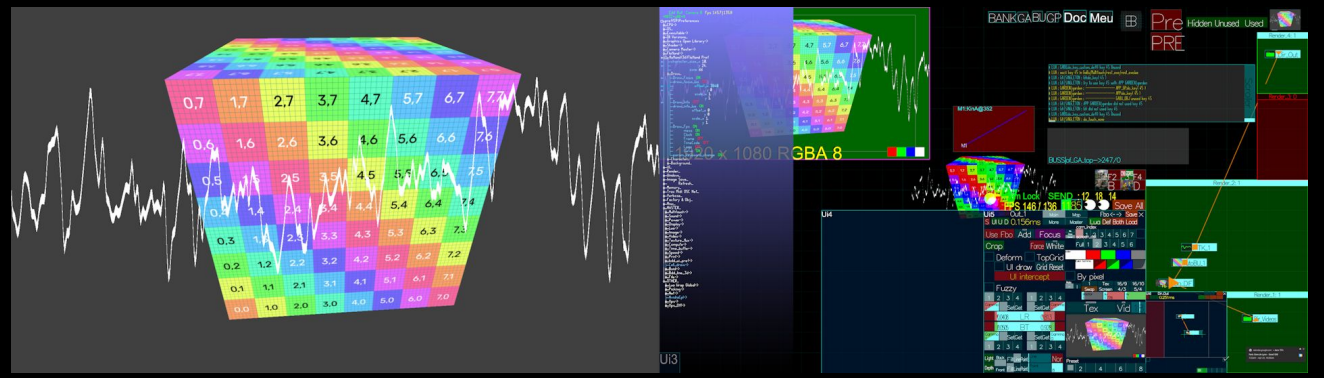
  draw_focus_offset_x/y

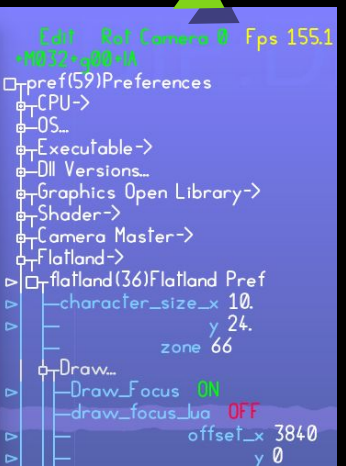
  Careful it can make **Flatland invisible**

  in some configurations

  (**drawn outside**)

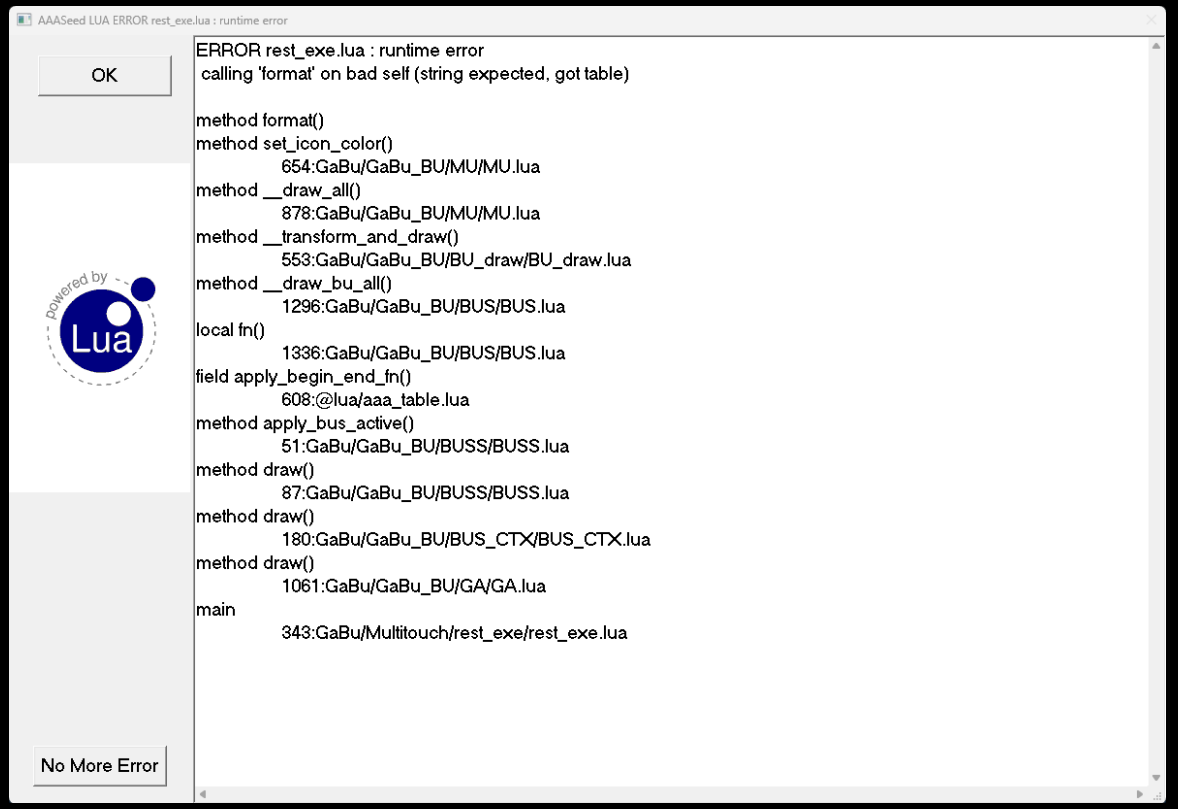


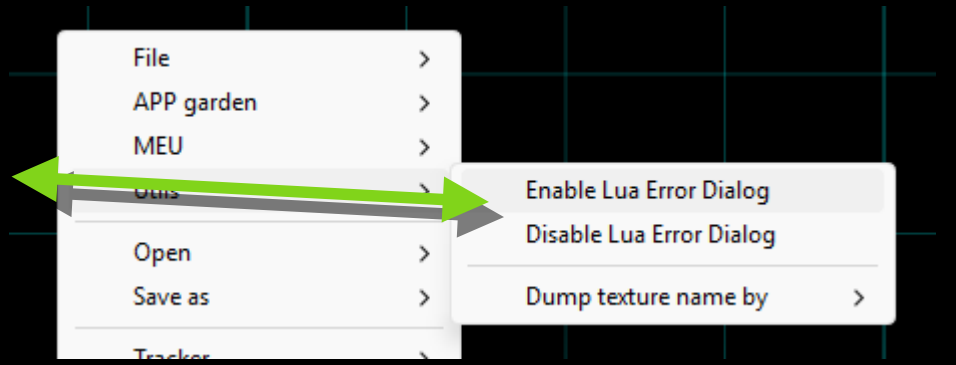




Lua Error Dialog

- Lua scripts run GaBuZoMeu
  - Errors can trigger an error Dialog
- Dialog
  - Display the error and its call stack, open associated editor at the error location. We use VSCode by default.
  - Correct the error in the text editor if you understand what you do. Save the modified file.
  - Click Ok
    - The eventually modified version will be used.
    - Future errors will triggers this dialog.
  - Or Click No More Error
    - Errors will not triggers this dialog anymore
    - not recommended of you don't know what you are doing.
    - All future errors will be displayed in the terminal window. Most likely AAASeed will start to behave strangely and you will not understand what is going on.
- Menu Utils control same lua Error Dialog preferences
  - Always Enable to see problems
  - Disable for permanent installation





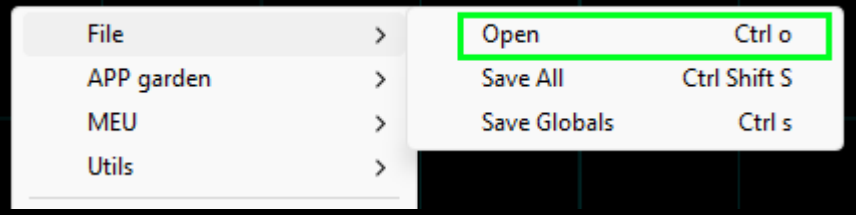
APPlications or APP

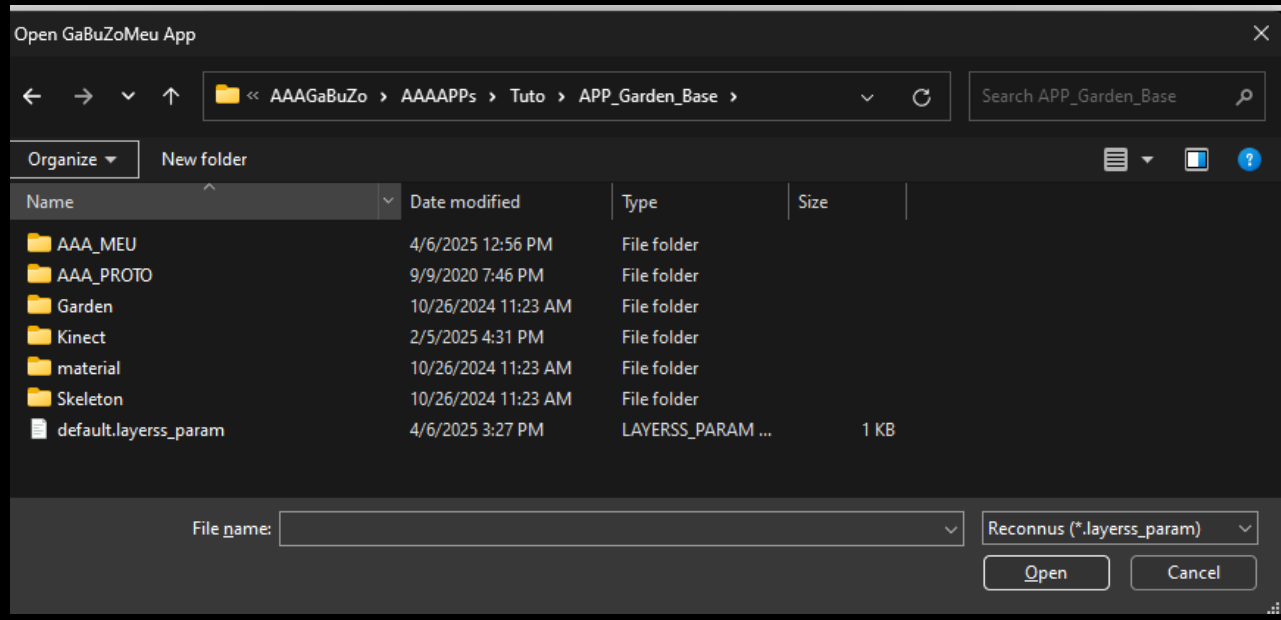
- Open APPlication Garden_Base
  - **Use Main Menu File/Open** or **Ctrl o**
- **File Dialog**
  - goto **Start folder**
  - Then **AAAAPPs** folder
  - then **Tuto** folder
  - then **APP_garden_base**
  - **open default.layerss_param**

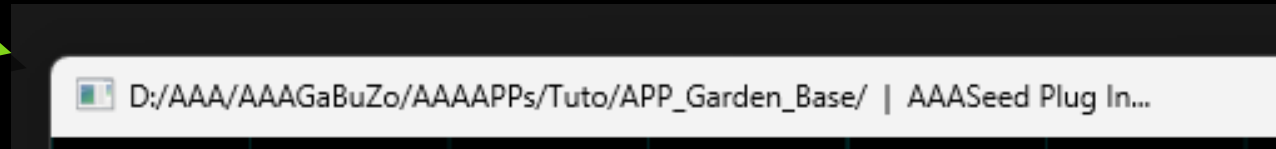
    The APP is the folder

    The folder is the APP
  - Bug:

    Sometimes you need to open it again
- **Name** in the **window bar**

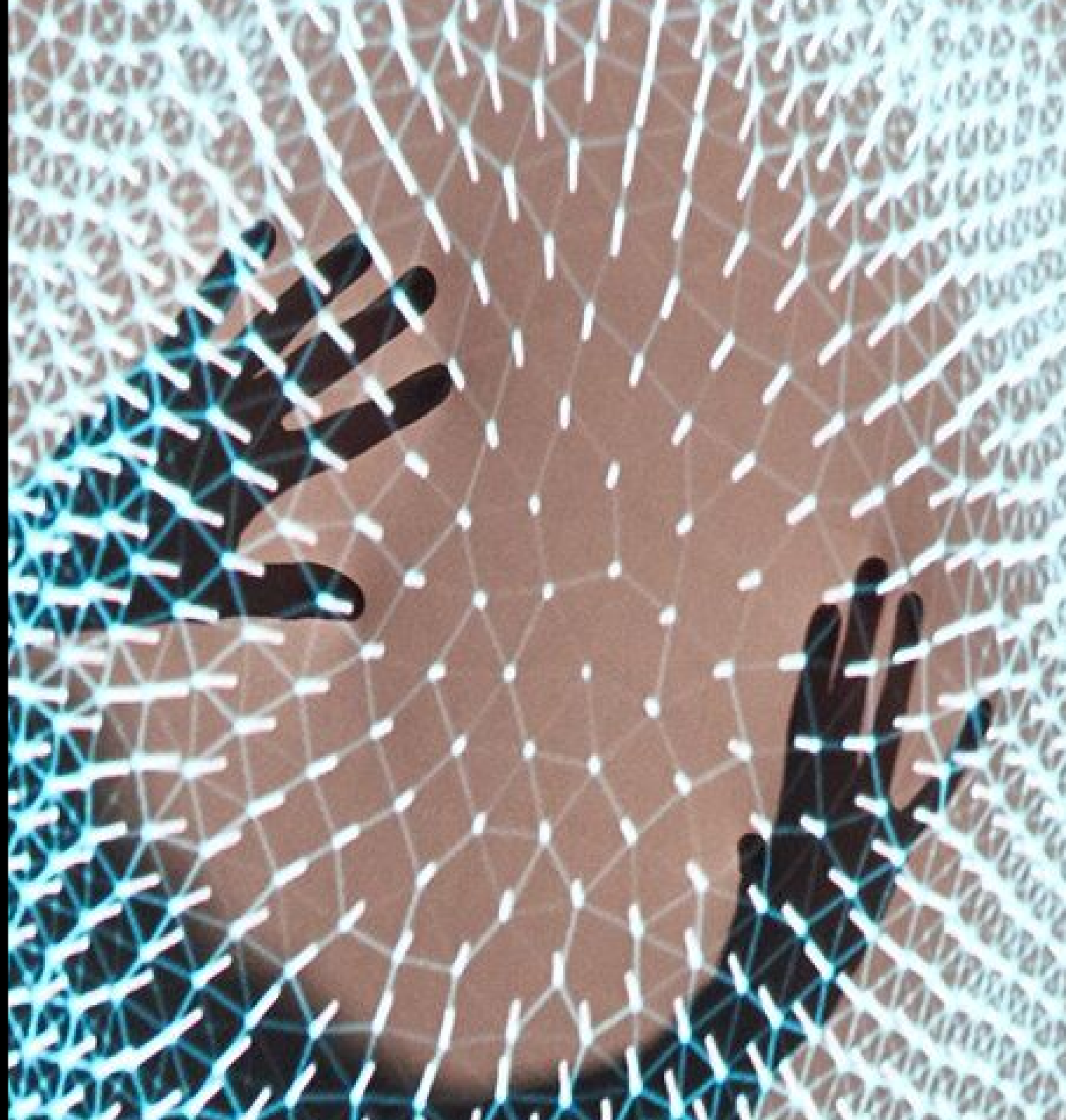






AAASeed
An introduction
Part 4:
BU first contact

- Basic UI
- BU = Box User
- BU Resize Move
- BU StarMenu
- Dialog
- Current BU
- BU Resize more



Basic UI

- **Don't be intimidated**

  need to get used

  UI is efficient.

- **Avoid Caps Lock**
  it can cause confusion

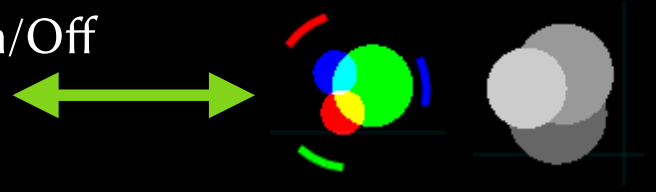
- **F1** or **Ctrl h** like (**h**)elp
  ⟶ Toggle **help** system On/Off

- **F2**
  ⟶ Toggle **GaBuZoMeu UI**

- **Ctrl F2**
  ⟶ Force **GaBuZoMeu UI On** and **move it between screens (see Part 3)**

- **F3**
  ⟶ Toggle **render process** On/Off
  BU_Alive visualize this state

  and is **Clickable**



Help the interface is still active except for the keys used by this help :
F1 or CTRL h : Toggle +|− | CTRL Mouse Wheel : Size
Arrows|Page up/Down|Home|End|Mouse Wheel : Navigate

AVOID AVOID AVOID Caps Lock : it will get you lost

Use a Mouse or TouchScreen

GaBuZoMeu

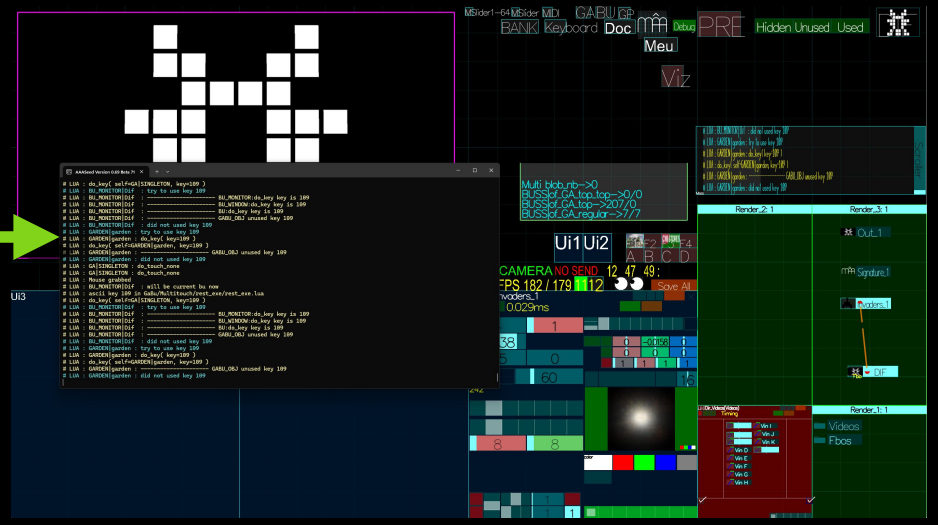
GA	Global Action
BU	Box User : the interface elements you can interact with
ZO	unused for now (don't worry we working very very hard on it)
MEU	Module Editable Unit : an encapsulated functional Block
MU	Module Unit : a compact MEU view used to control the execution order

MOUSE

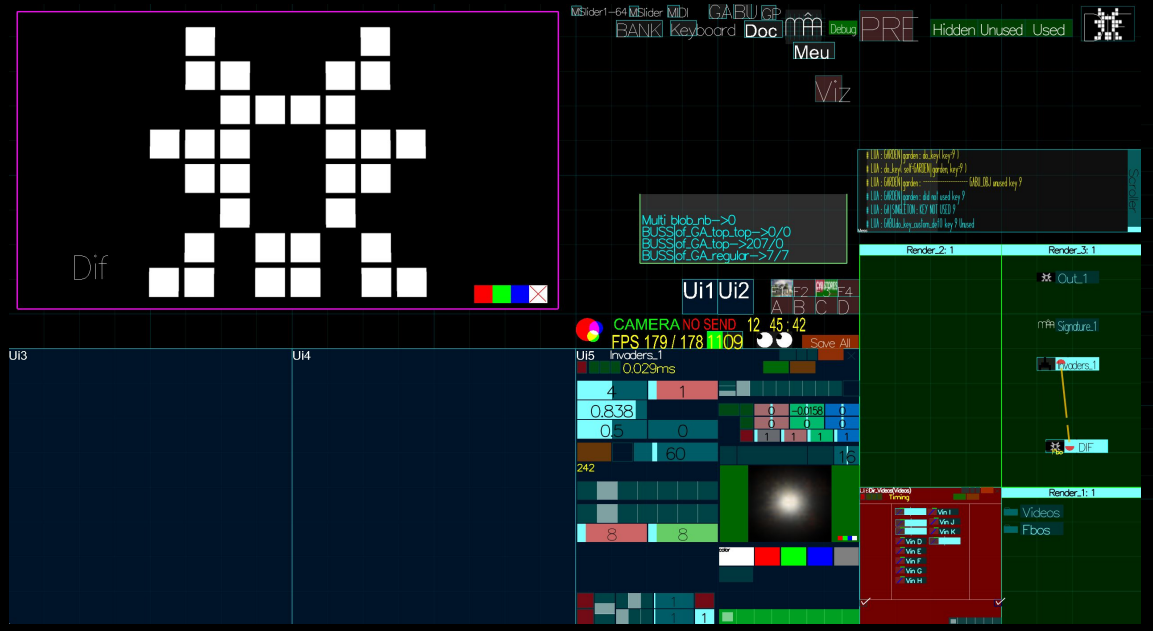
Left Button	Action
Wheel Button	Scroll
Right Button	Menu

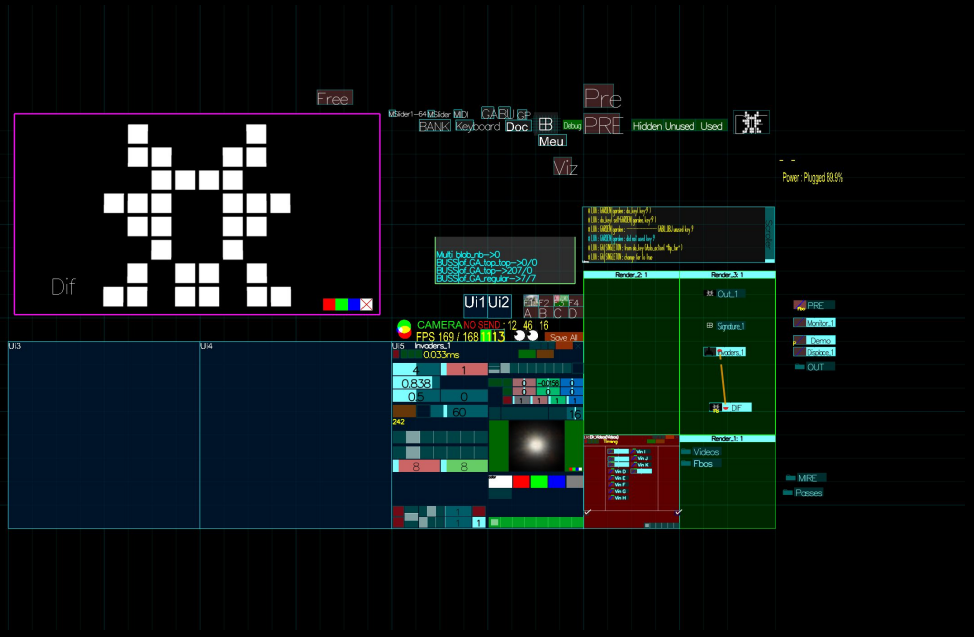
Basic UI more

- **m** like (**m**)essage
  → pop the **terminal window**



- **Ctrl Tab**
  → Toggle between two **UI Scales**





BU = Box User

- The **atomic UI element** in **AAASeed**.

  Hierarchical:

  BUs contain BUS

  BUS contain Bus

  BUS / BU / BUS / BU…

  Interactive:

  Click, resize, move and nest them to build UIs.

- To see this

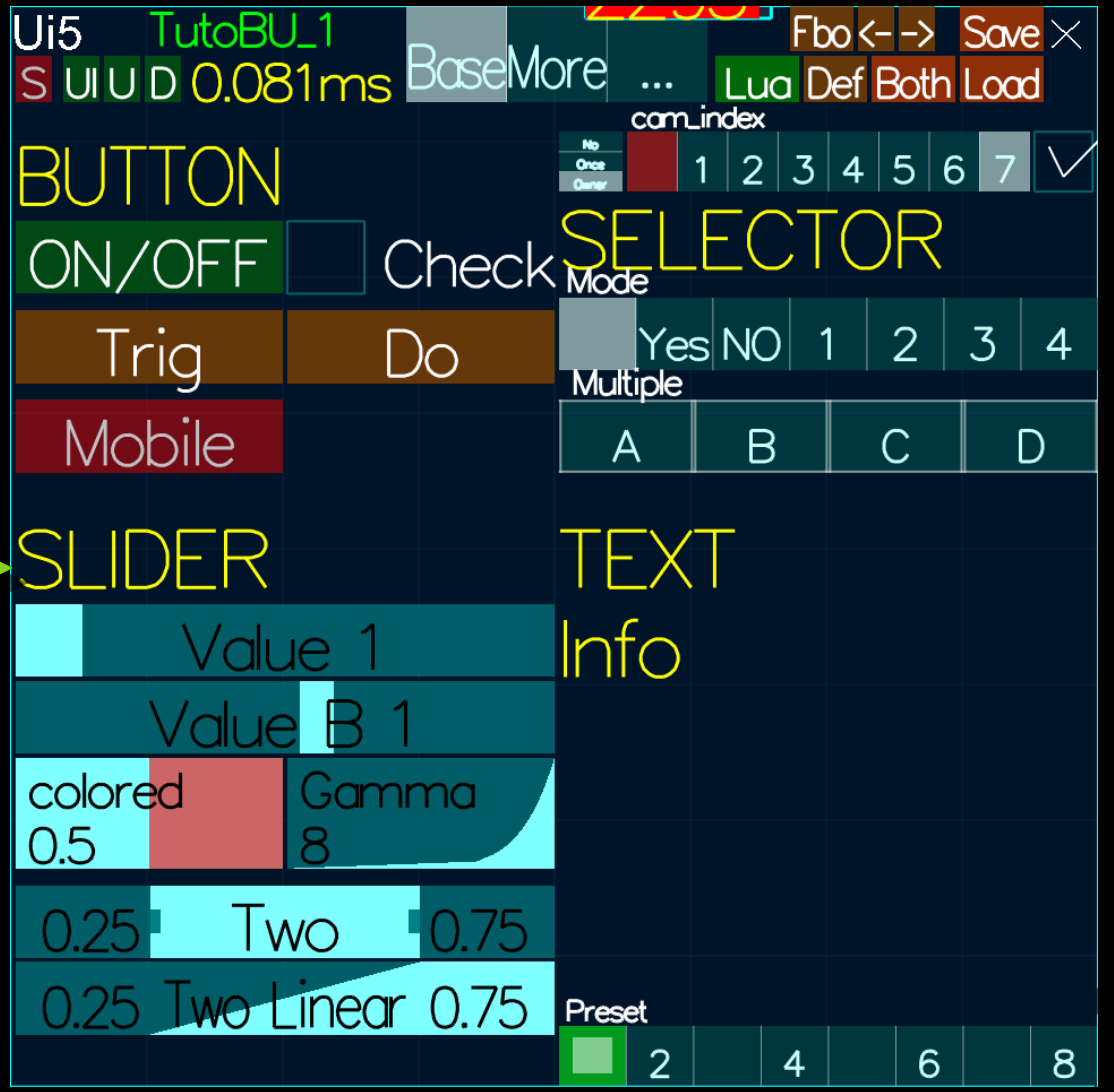
  Click on the icon of TutoBU_1

- **Click**

  Done with **left button**

  4 types

  - **Simple**
  - **Double**
  - **Triple** (rare)
  - **Long** (stay fix with button pressed, rare)



BU Resize Move

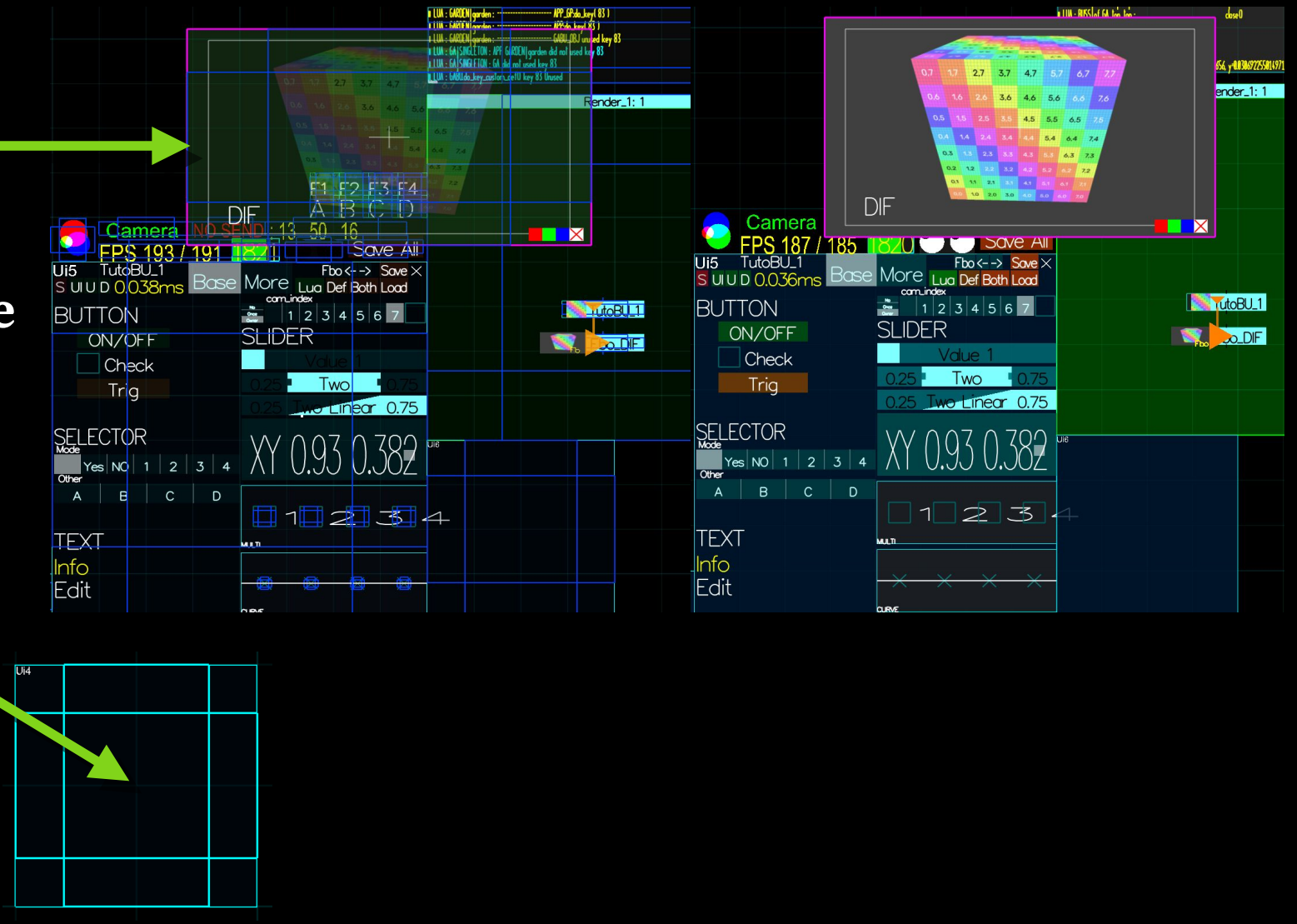
- **Hold Alt**
  - **Transparent**

    You can see under
  - **Blue Flashing Frame**

- **Click with Alt**
  - **Center zone**

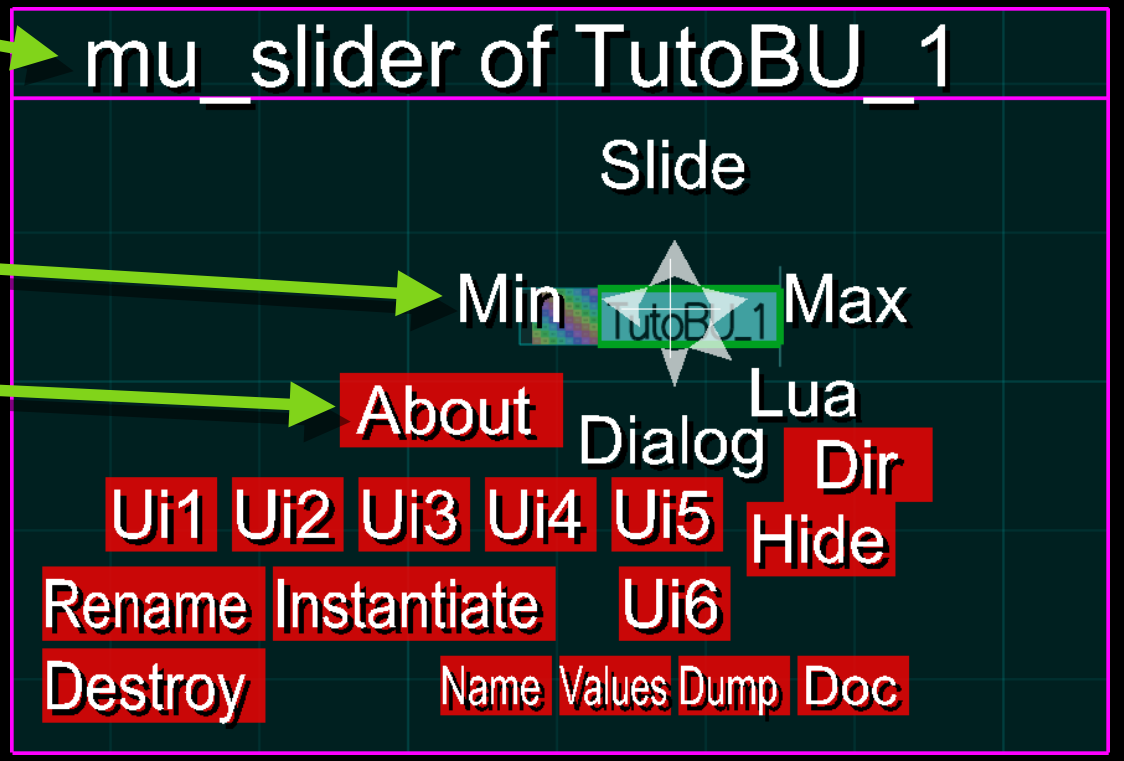
    → **Move**
  - 8 **edge zones**

    → **Resize**



BU StarMenu

- **Example:**
  Click on TutoBU_1 slider
  keeping button pushed
- **StarMenu**
  Name of its **BU** at the **top**
  Also named **UIF** for **UI Fast**
  AAASeed proximity UI
  It is a **Contextual Menu** with
  - **Zones** (White texts)
    go in the arrow direction
  - **Button** (Red rectangles)
    move on the button
- **Quick Drag-out**
  All BU have a StarMEnu, but not all BU display their **StarMenu on Click.**
  In this case, click, and with the **mouse button still pressed, go quickly out of the BU** rectangle: StarMenu Appears.

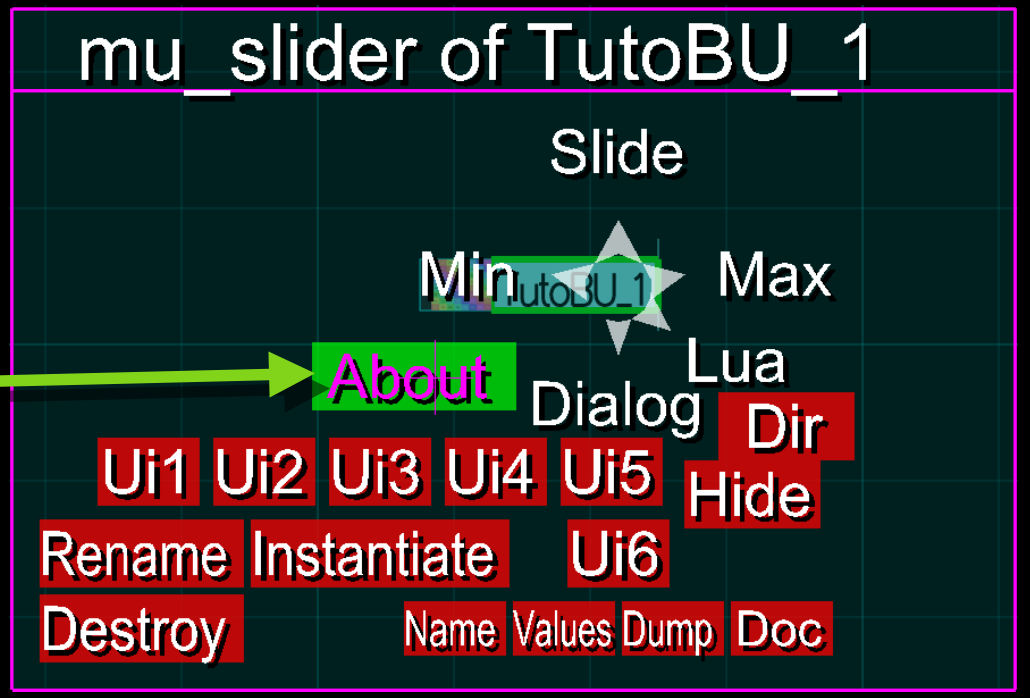


Dialog

- Example:

  Click on TutoBU_1 slider

  use **About** button



- **Dialog**

  Flashing Red for attention

  Move / Resize using Alt as Always

  Click to dismiss

  Some ask for confirmation

Current BU

- **Clicked** BU

  becomes **current**

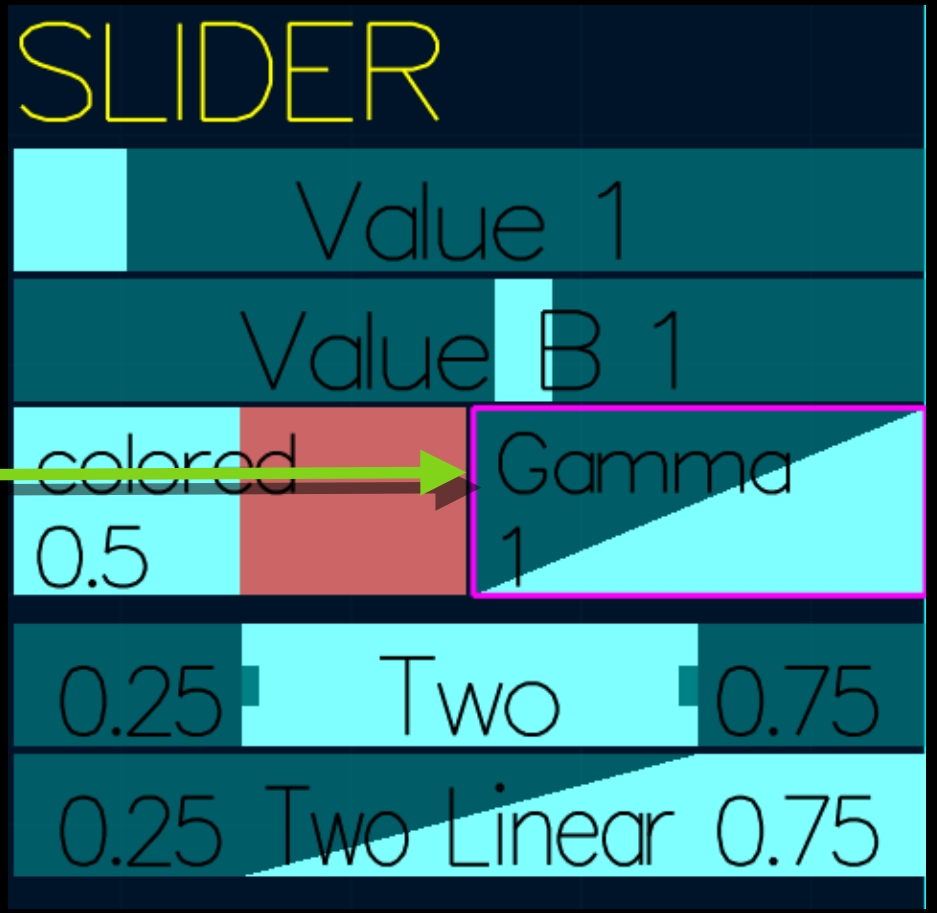
  Violet frame

  Receives keyboard input

- **Arrows key to navigate**

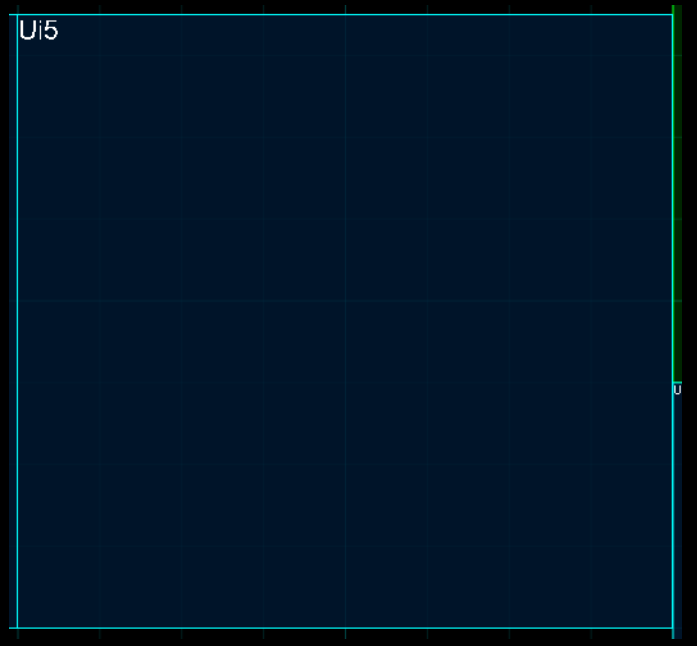
  perhaps some bugs left

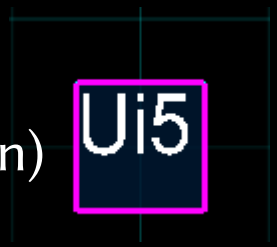
  we need feedback (2025 August)

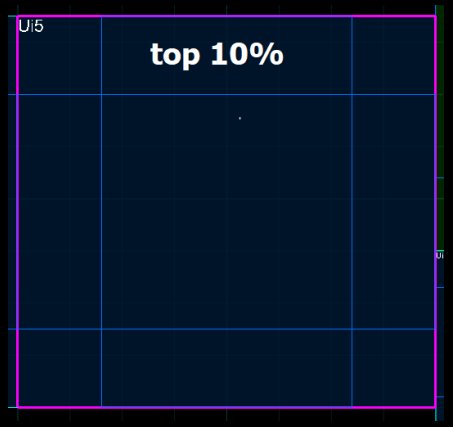


BU Resize more

- **Alt click** move resize
  - **Alt Arrow**
    → **Move**
  - **Alt** + - * /
    → **Size**
- **Some BU have 3 states** (like a window)
  - **Normal**
  - **Full** (Big like the screen)
  - **Mini** (Minimized like an Icon)
- **Shortcuts**
  - **Double click, Space**
    → Toggle **Normal** ↔ **Full**
  - **Double-click top 10%**
    → **Mini**
  - **Ctrl Space**
    → Toggle **Normal** ↔ **Mini**

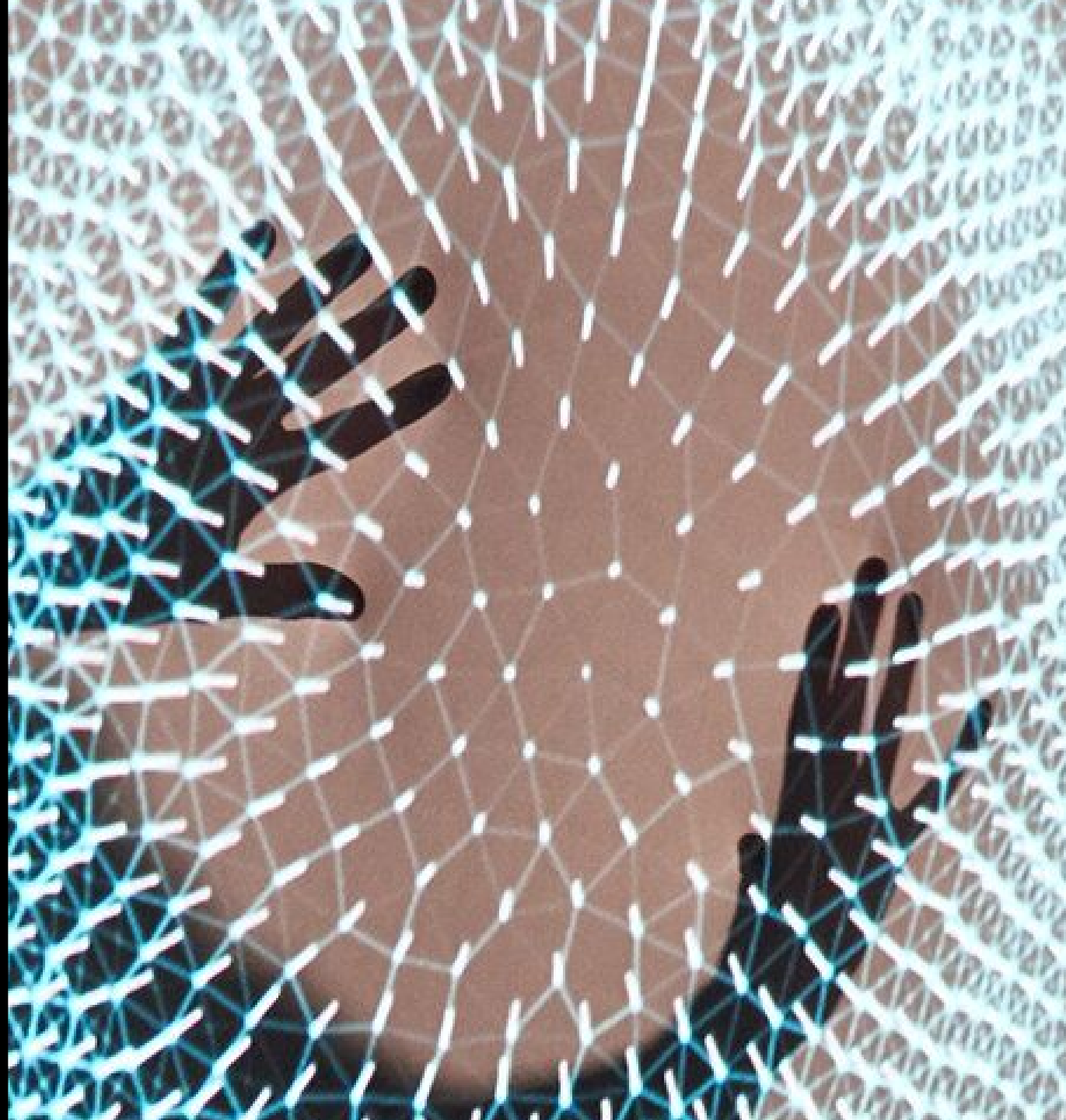






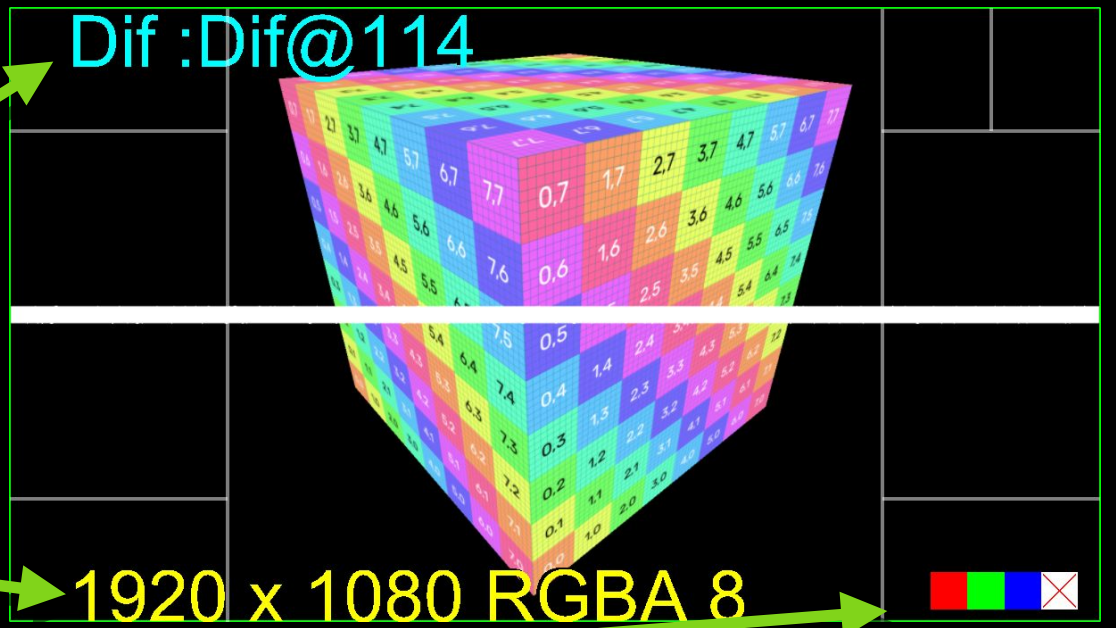
AAASeed
An introduction
Part 5:
BU_MONITOR

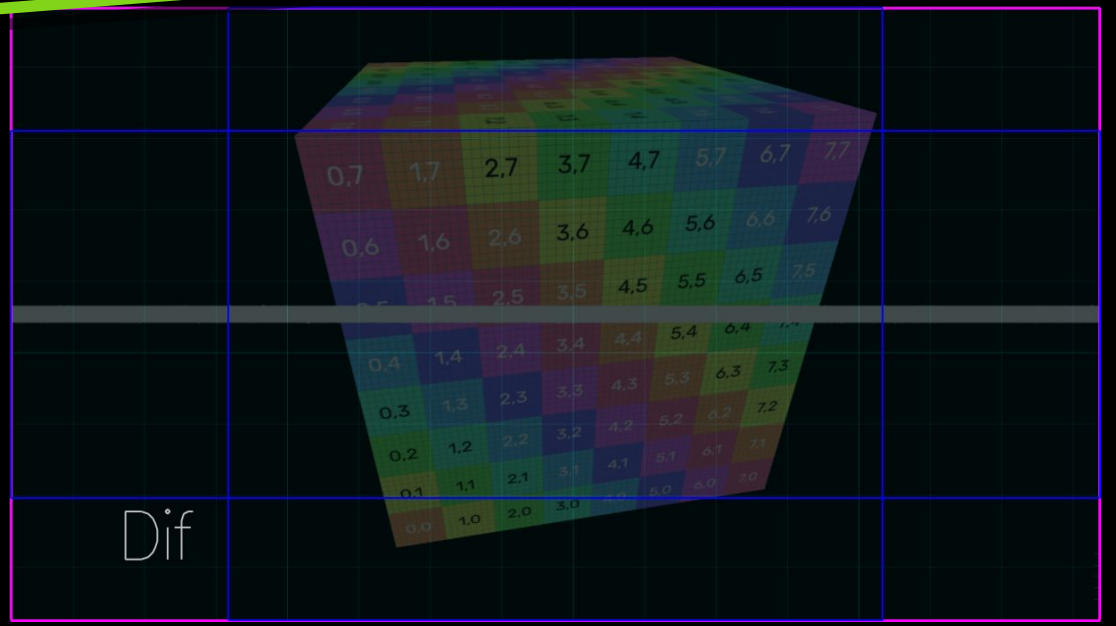
- Introduction
- Channels
- Alpha
- Click Zones
- StarMenu

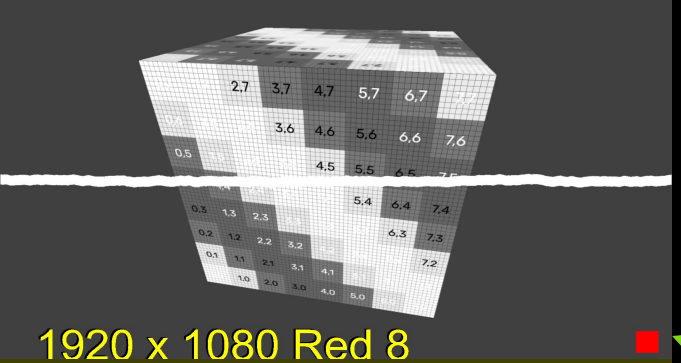


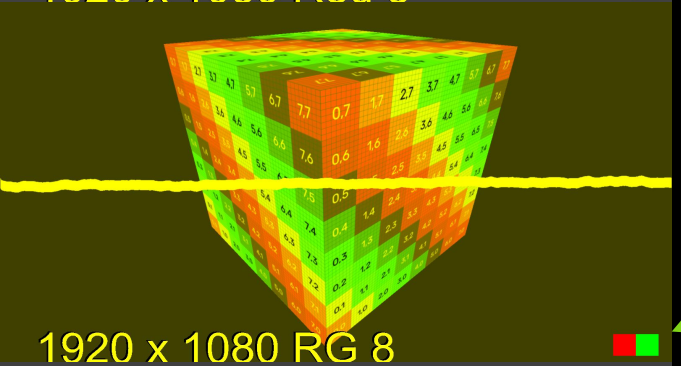
BU_MONITOR

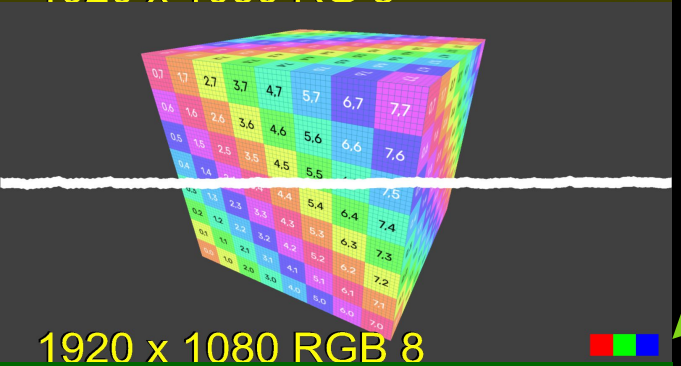
- Display Image
- When clicked
  - Display information on image
    - cyan text at top left
      - texture name / location
    - yellow text at bottom left
      - texture format
    - RGBA at bottom right
      - channels used and Alpha mode
  - Display Click Zones
    - the white rectangles
    - See Click Zones on next slides
- When click is released
  - depending where (in which **Click Zone**)
    - a command can be executed
- Move / Resize as usual
  - Alt...

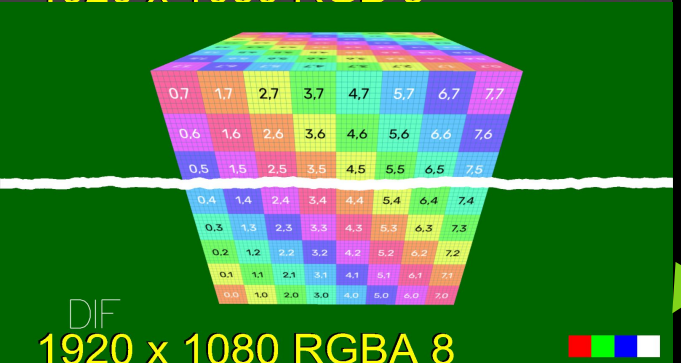










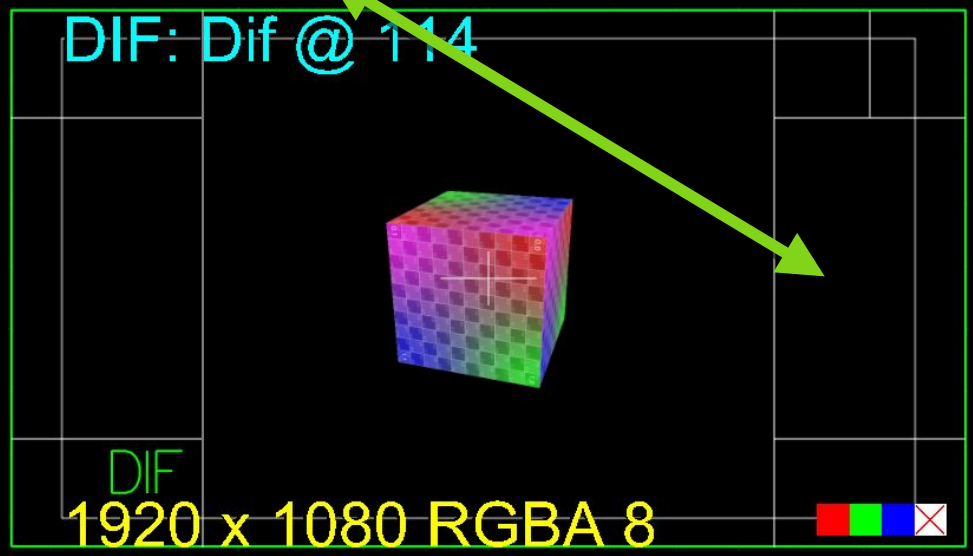


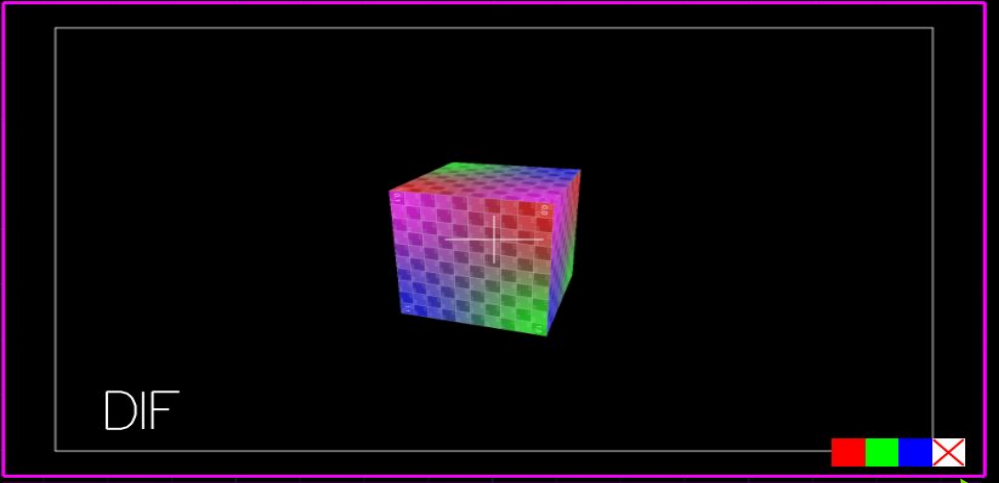
BU_MONITOR Channels

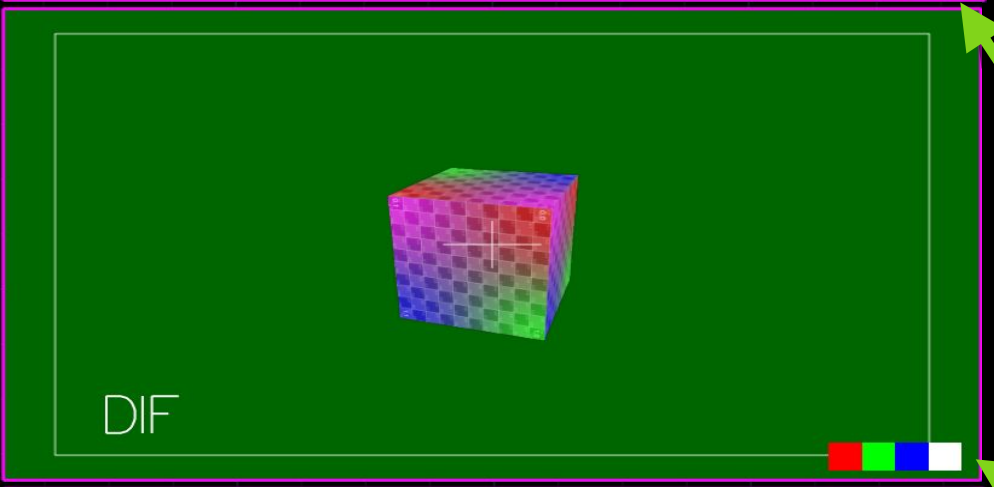
- In fact BU_MONITOR **shows textures**
- **Textures have a number of channels**
  - **1 or R for Red**
    showed as **greyscale**
  - **2 or RG for Red + Green**
    - showed as **yellow**
      no Blue
  - **3 or RGB for Red + Green + Blue**
    full color
  - 4 or **RGBA for RGB + Alpha**
    like RGB but with transparency/Opacity
    0 mean transparent, 1 Opaque
    different method to display Alpha
    Regular / Inverse / No
    See next slide

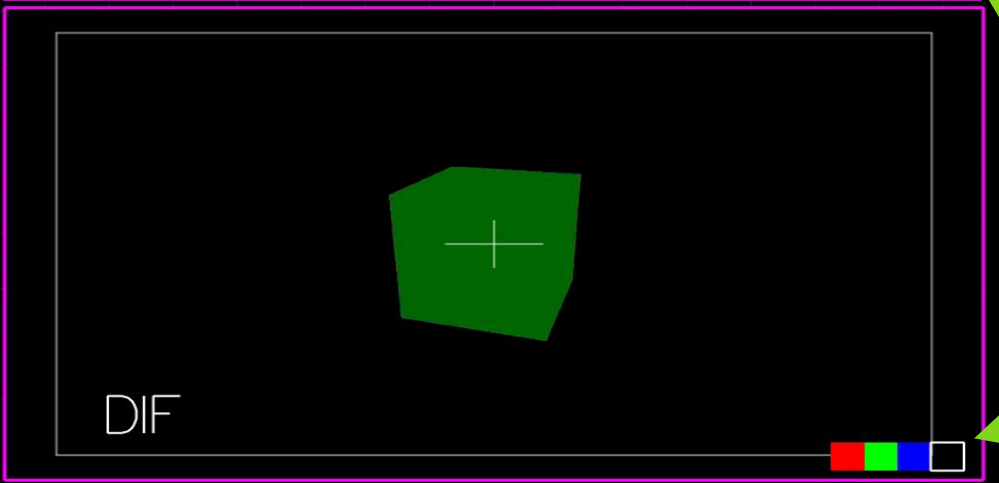
BU_MONITOR Alpha

- **Click in Right Middle, Key + -**









→ change how **alpha is displayed** (only for RGBA)

- Ignored
- Used
- Used inverted

BU_MONITOR Click Zones

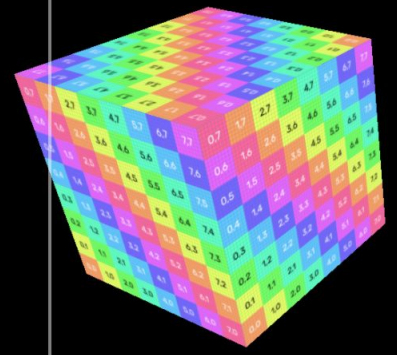
When the click is released the command is selected and executed

Flip Texture Bank/Bind information

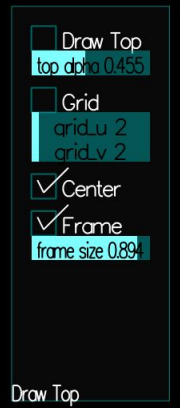
DIF:Dif@114

Flip Window More

Flip Window Draw Top



Flip Texture informations

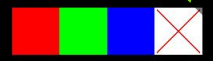


Flip Alpha Mode also Key + -

DIF

1920 x 1080 RGBA 8

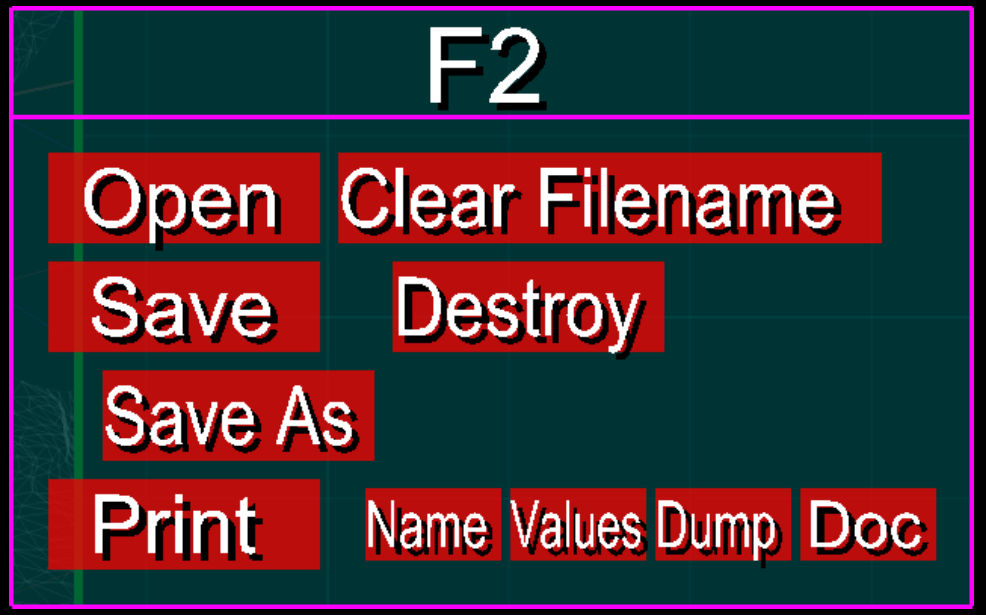
Flip Texture information: resolution and format



Flip channel display

BU_MONITOR StarMenu

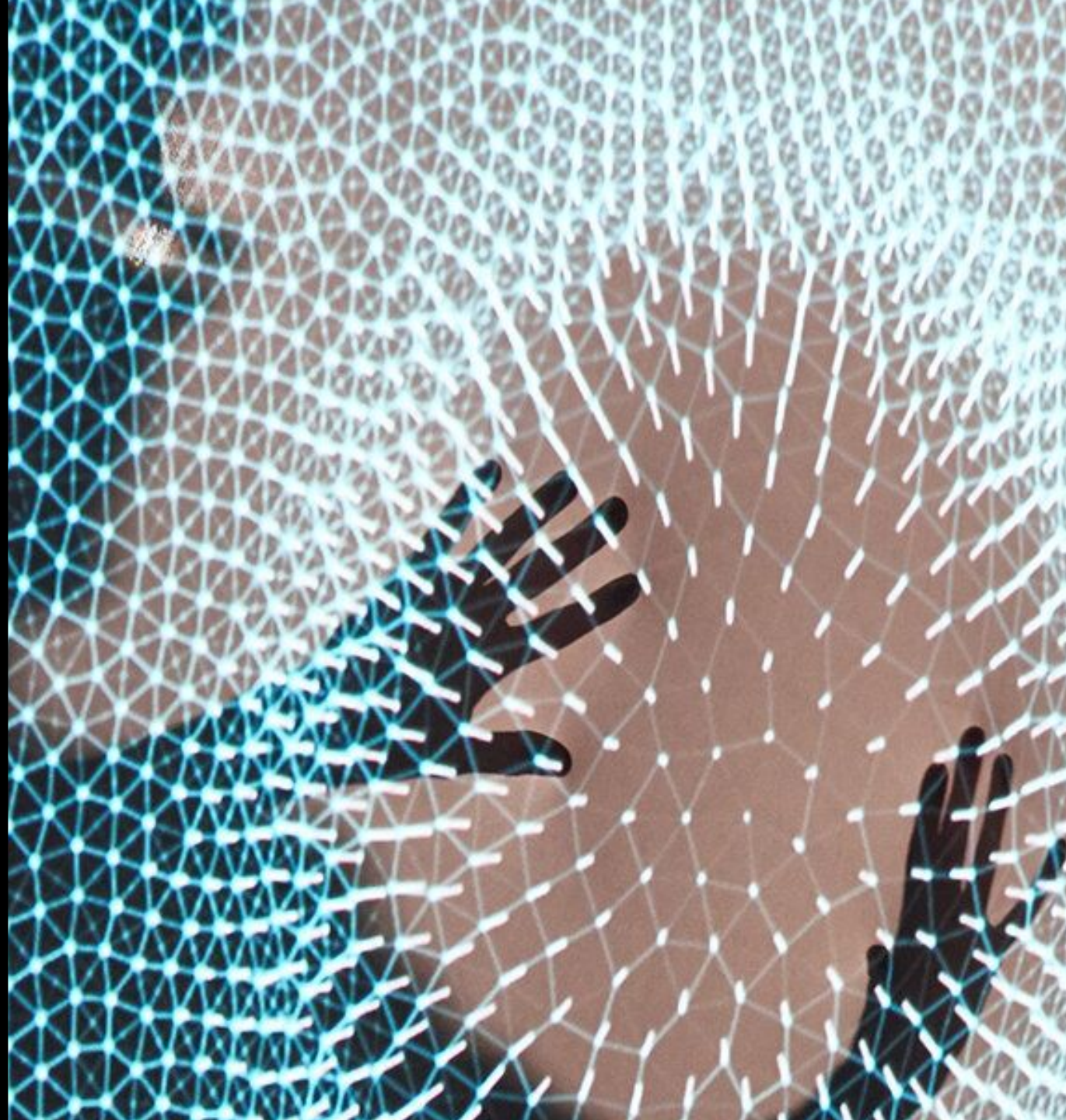
- **Use Quick drag-out** like any BU where it doesn't appear directly



- **Open**
  - **Load image(s) via a file dialog**
    - **at the current bind**
      - later on this (Part 14: Texture)
    - **can choose several files**
      - loaded in successive binds
  - **Set the filename for this bind**
- **Save**
  - **Save the Image to** Media/AAASnapshots
  - How it is saved is in Flatland Prefs/Image Save
  - **Note that Save do not use the bind filename set by Open**
- **Save As**
  - **Save with a file dialog to choose location**
- **Print**
  - **Print the image**
  - How it is printed is in Flatland Prefs/MASTER/Print
- **Clear Filename**
  - **Clear the the filename for this bind**
- **Destroy**
  - **Destroy the texture for this bind**
  - **Clear the filename too**: no more pixels or filename left

AAASeed
An introduction
Part 6:
BU is all you need

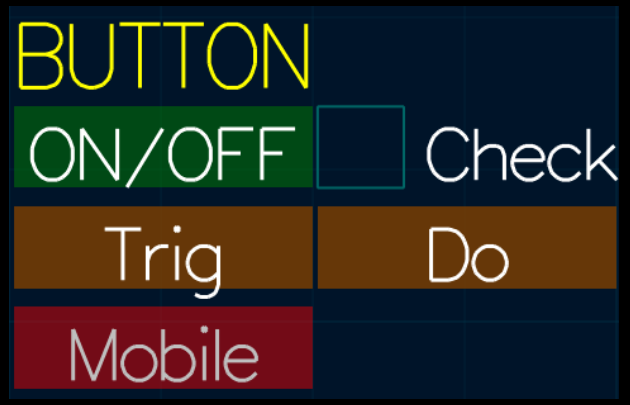
- Basic BU
- BUTTON
- SLIDER
- SLIDER_TWO
- SELECTOR
- BU_TEXT

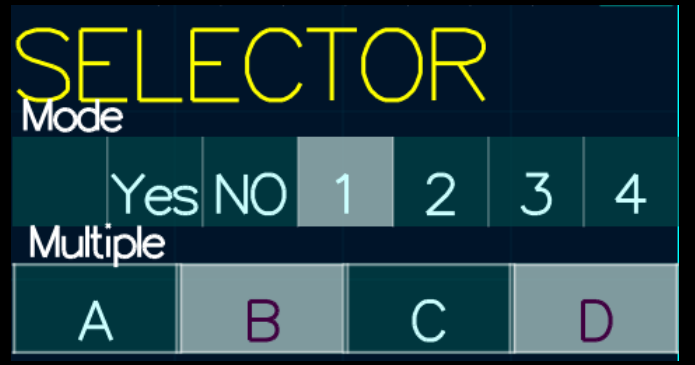


Basic BU

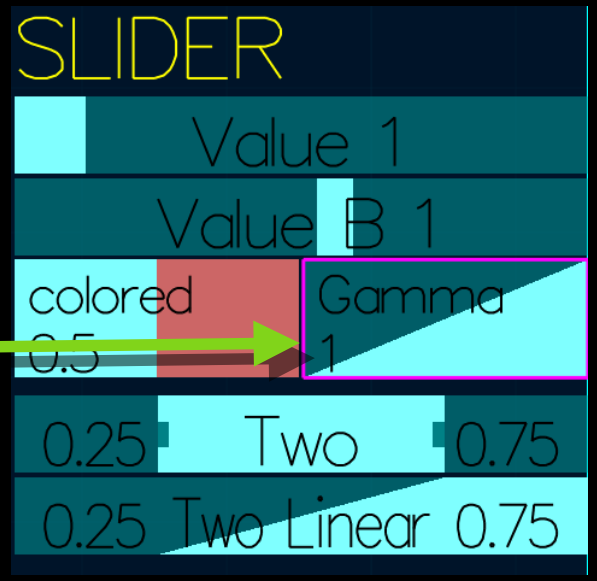
- Click on Train_BU icon

- **BUTTON**
- **SLIDER**
- **SELECTOR**
- **BU_TEXT**





- Current **BU** (reminder)
  receives keyboard
  violet rectangle
  navigate with **arrows keys**



BUTTON

On/Off

2 versions

green / Red

checkbox

Developer note: boolean or integer

Trigger

Launch an Action

Usually Orange

Eventually with **confirmation**

Could be **movable** too

Try drag the Mobile button

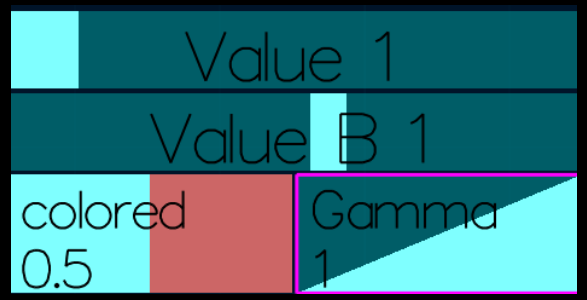
StarMenu Access

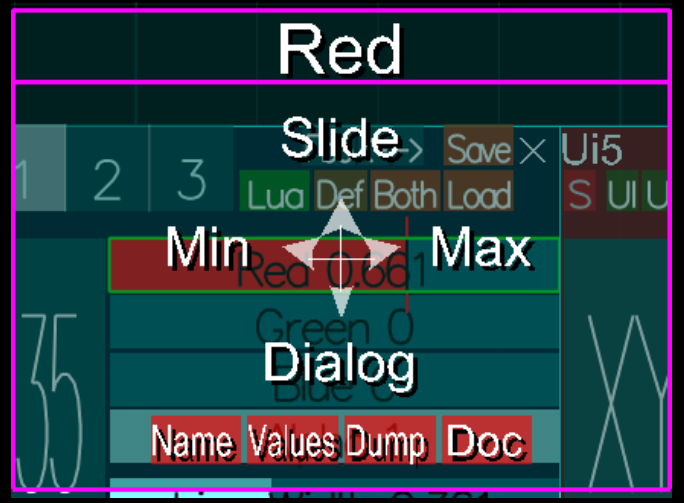
Quick drag-out

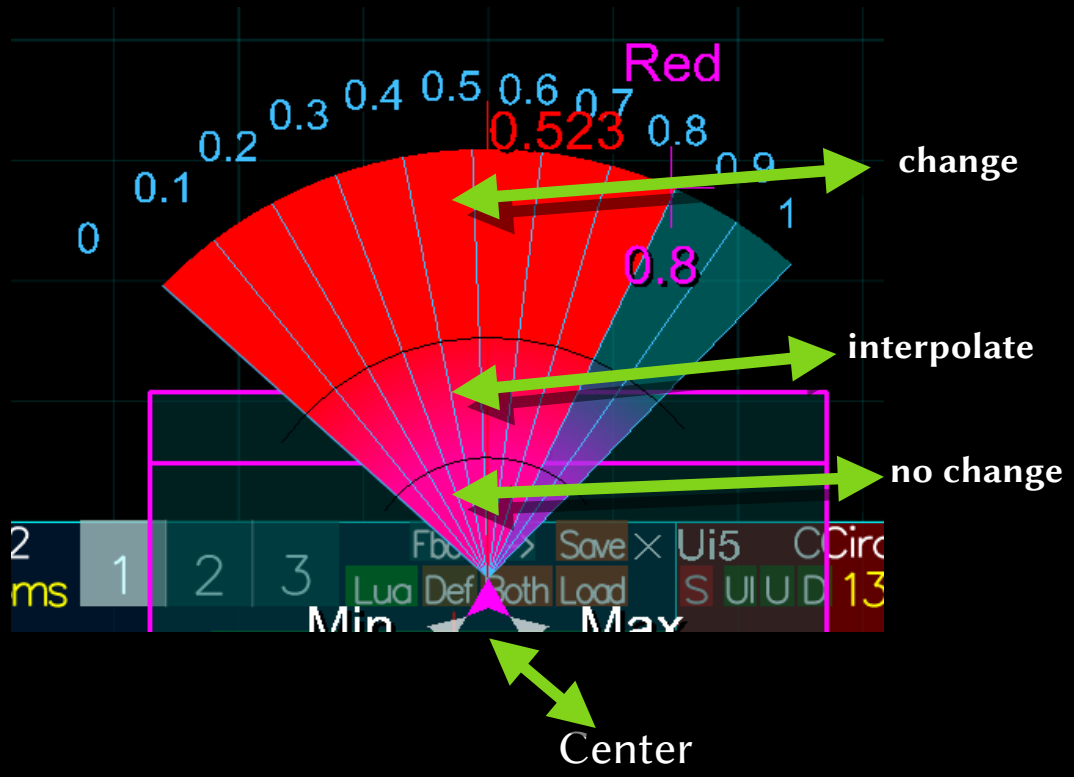
except on mobile BU

SLIDER

- Adjust a single value
- Click
  - → StarMenu
- Slide
  - Go up in Slide direction
  - Go to external circle
    - External circle→ change
    - Internal circle → no change
    - Intermediate circle → interpolate
  - Angle change value
    - the more away from center the more precise
  - Go back to internal circle to cancel
  - Shift → lock on closest default value
  - Ctrl → smaller change from start value
  - Ctrl Alt → even smaller change



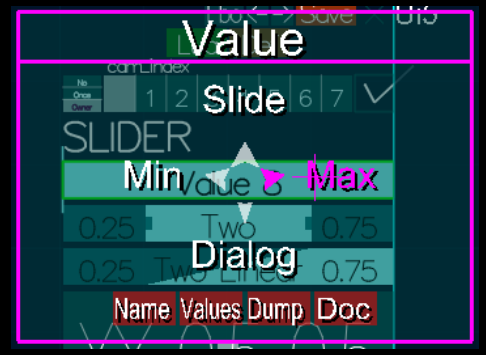


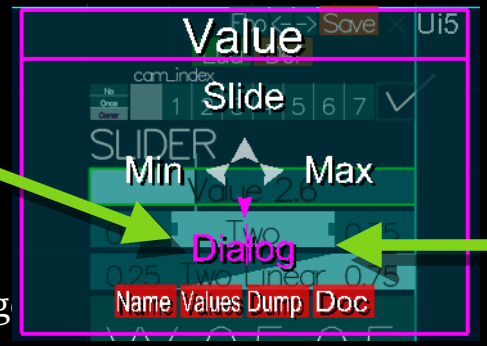


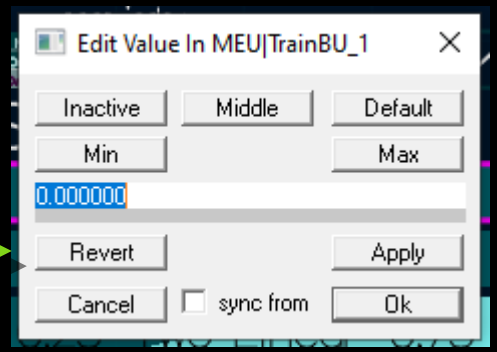
SLIDER

- **Min / Max**
  set to Min or Max values
  defined for each slider
- **Dialog edit**
  Double Click or Dialog zone

- **Keys** (act on current BU if no Flatland)
  - + - * / → **change**
  - **Enter** → **inverse**
  - . → **floor integer** (round to inferior integ
  - **Home** → **Default**
  - **End** → **Inactive**
  - **PageUp** → **Max**imum
  - **PageDown** → **Min**imum

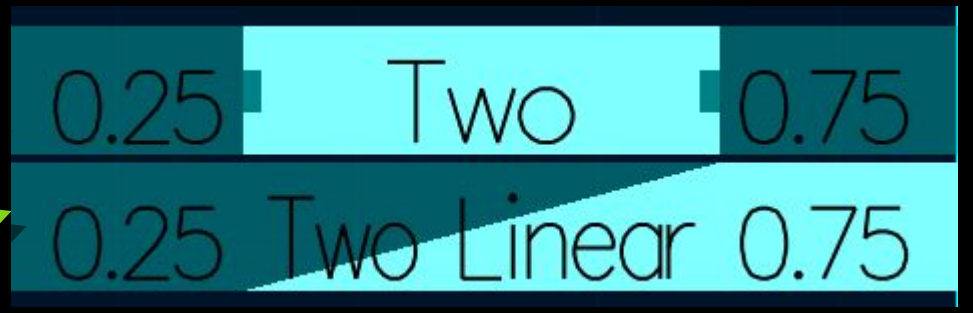




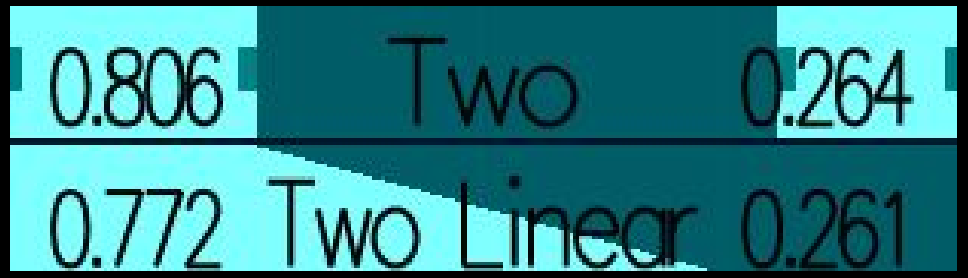


- **slider value** can be
  clamped to interval [Min,Max]
  or free from [Min,Max] limitation, in this case Min and Max as just used to display the slider and by the Ui
- **slider value** can be **Floating point or integer**

SLIDER_TWO



- SLIDER but **2 values**
- Display as Range or Linear
- Value changed depends **where you click**
  - Closest is selected for interaction
  - Last interacted value receive keyboard input



- Values can be **Flipped**
  - Left value bigger than right
  - Displayed differently

SELECTOR

- **Click**

  Keep mouse down

  Change with position

- Access to **StarMenu**

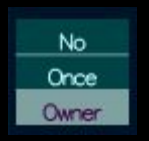
  like **BUTTON**: **Quick drag-out**

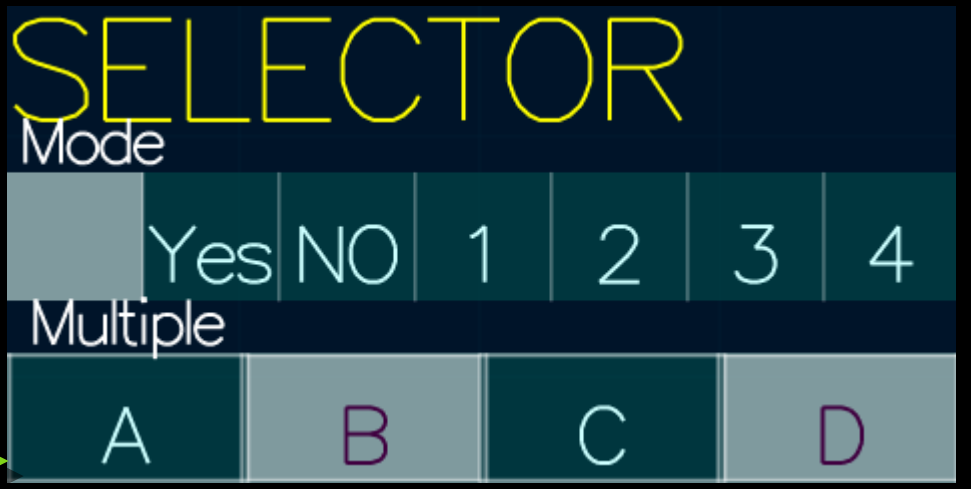
- Use **keyboard as for a SLIDER**

  + and - mainly

- **Multiple selection** an option

  note frame around each item





SELECTOR

- Slide functions for selector too

  Go up

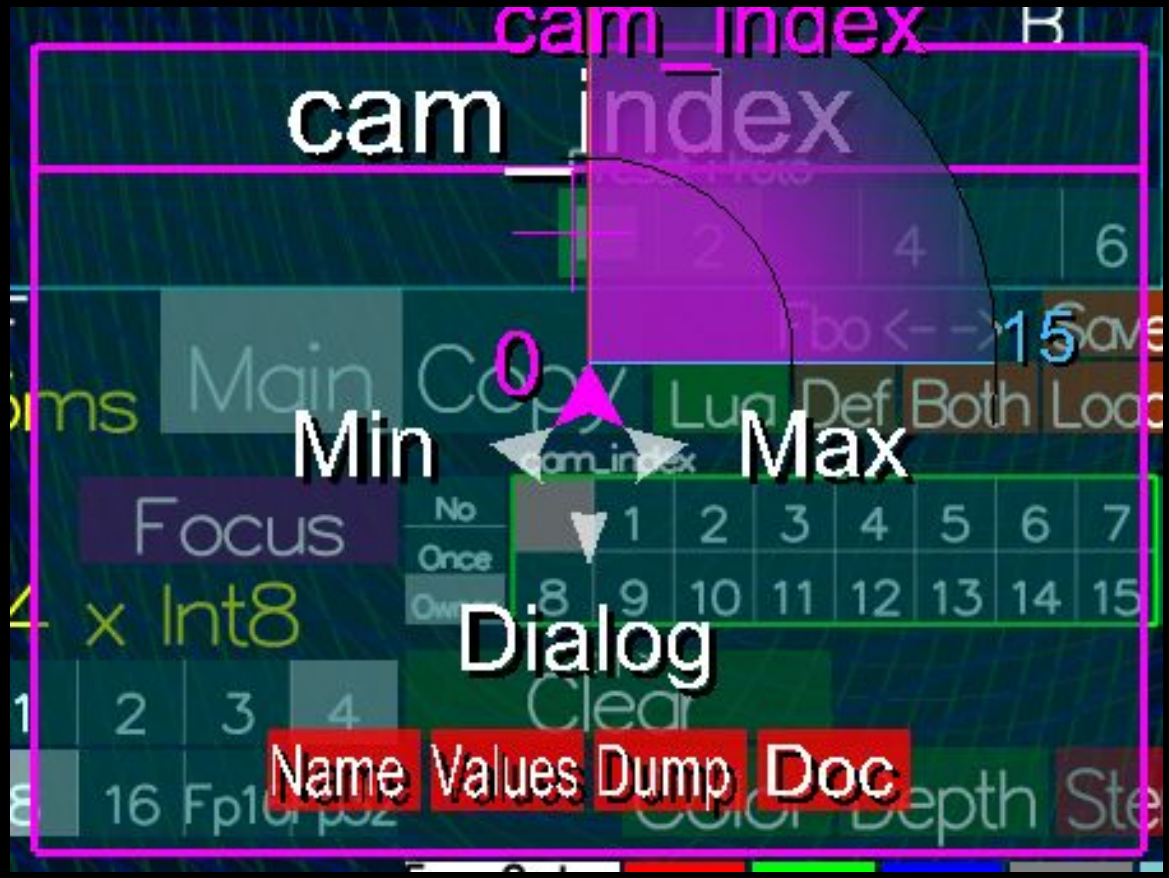
  then angle

  Shift

  lock on values

  Ctrl or Ctrl Alt

  sensibility



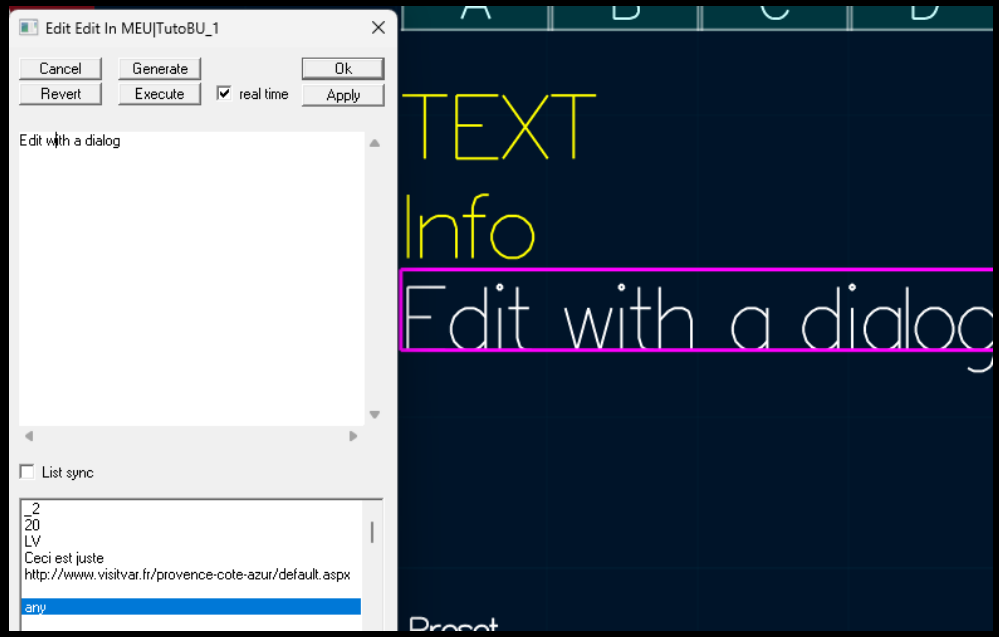
- Keys as usual
  - \+ - * / → **change**
  - **Enter** → **negate**
  - . → **floor integer**
  - **Page Down / Up** → **Min / Max**
  - **Home / End** → **Default / Default inactive**

BU_TEXT

- **BU_TEXT info**
  Yellow in general
  display info, not editable
- **BU_TEXT Editable**
  White in general
  Double Click → Edit

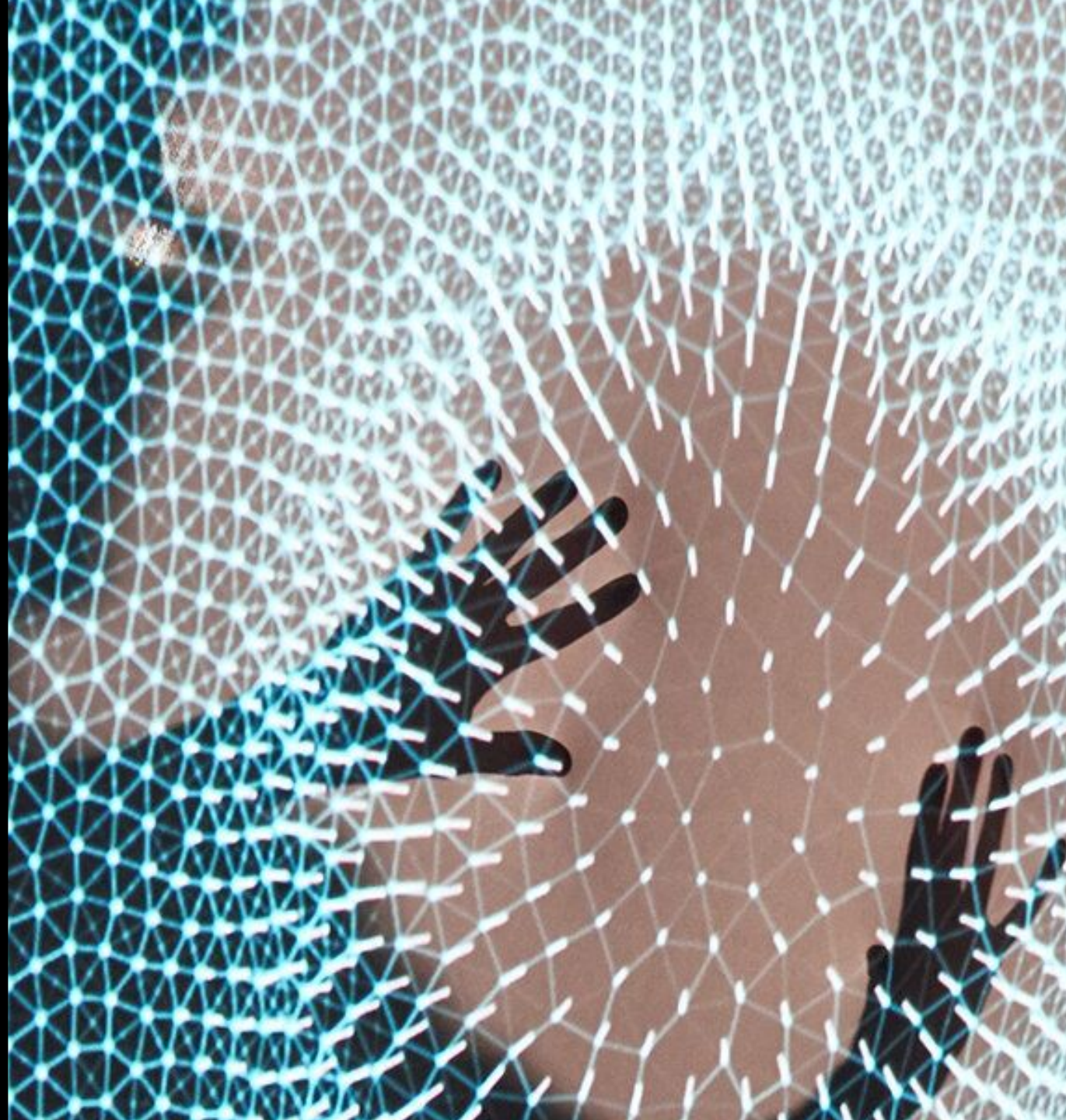
- Access to **StarMenu**
  like **BUTTON** and **SELECTOR**
  Quick drag-out

- will Evolve
- Edit dialog will Evolve too
- Virtual keyboard exists but not functional
  at the moment (2025 August)



AAASeed
An introduction
Part 7:
Meet more BUs

- **Other SLIDERs**
  - SLIDER_XY
  - SLIDER_MULTI
  - SLIDER_CURVE
- **Composite Bus**
  - BUTTON multiple
  - BUTTON menu
- **Copy / Paste**
- **Undo / Redo**



Other **SLIDERs**

Select More in top Selector to see

SLIDER_XY

2 values x y

SLIDER_MULTI

Edit several x, y, size_x and size_y

Alt to Move/Resize as usual

Alt Click → Move/Resiz

Alt Arrows → Move

Alt + - * / → Size

Double Click or Return key

→ toggle On/Off

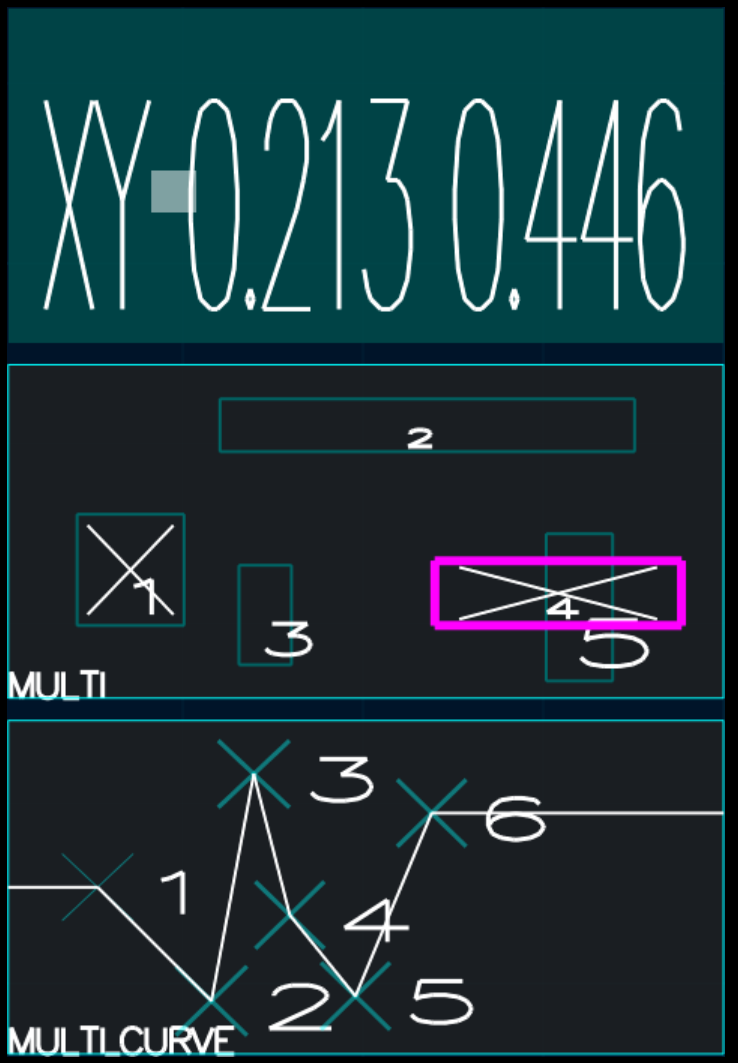
Key insert → Add point

Key delete → Remove point

SLIDER_MULTI_CURVE

linear curve

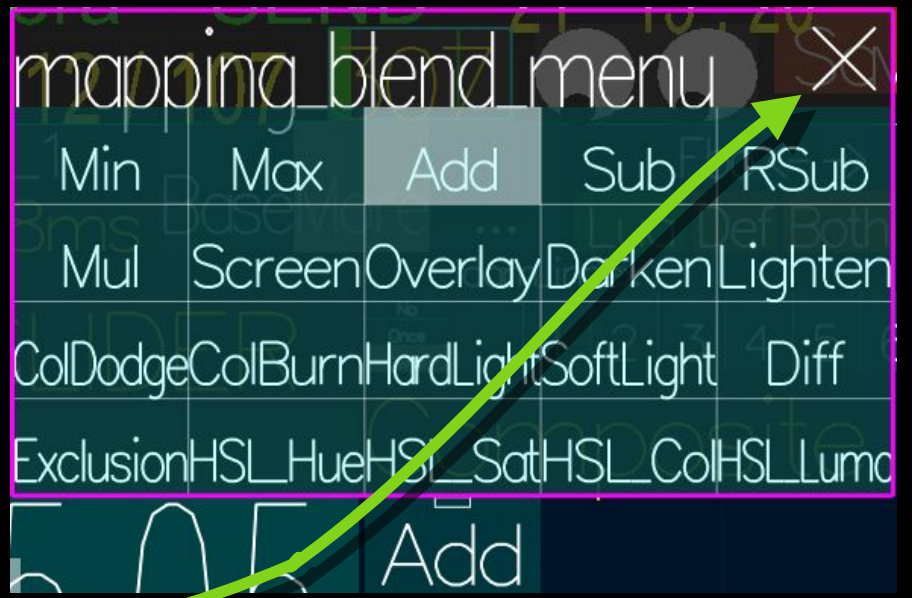
UI identical to SLIDER_MULTI



Composite BUs

- **BUTTON** multiple
  - < | > at the top
  - Use a hidden SELECTOR
  - **Click left or right → change value**
  - **Same keys as selector**

- **BUTTON** menu
  - small rectangle at the top
  - **Click**
    - → open a **SELECTOR** in a **window**
    - **move window to keep it open**
      - or it disappears after few seconds
    - **Close BU** at top right
      - close the window
  - **Same keys as selector**



Copy / Paste

- Ctrl c / Ctrl v
- Acts on current BU
- Shift extend it

    Copy / Paste not only a single BU

        but a bu_group or a MEU

            see later

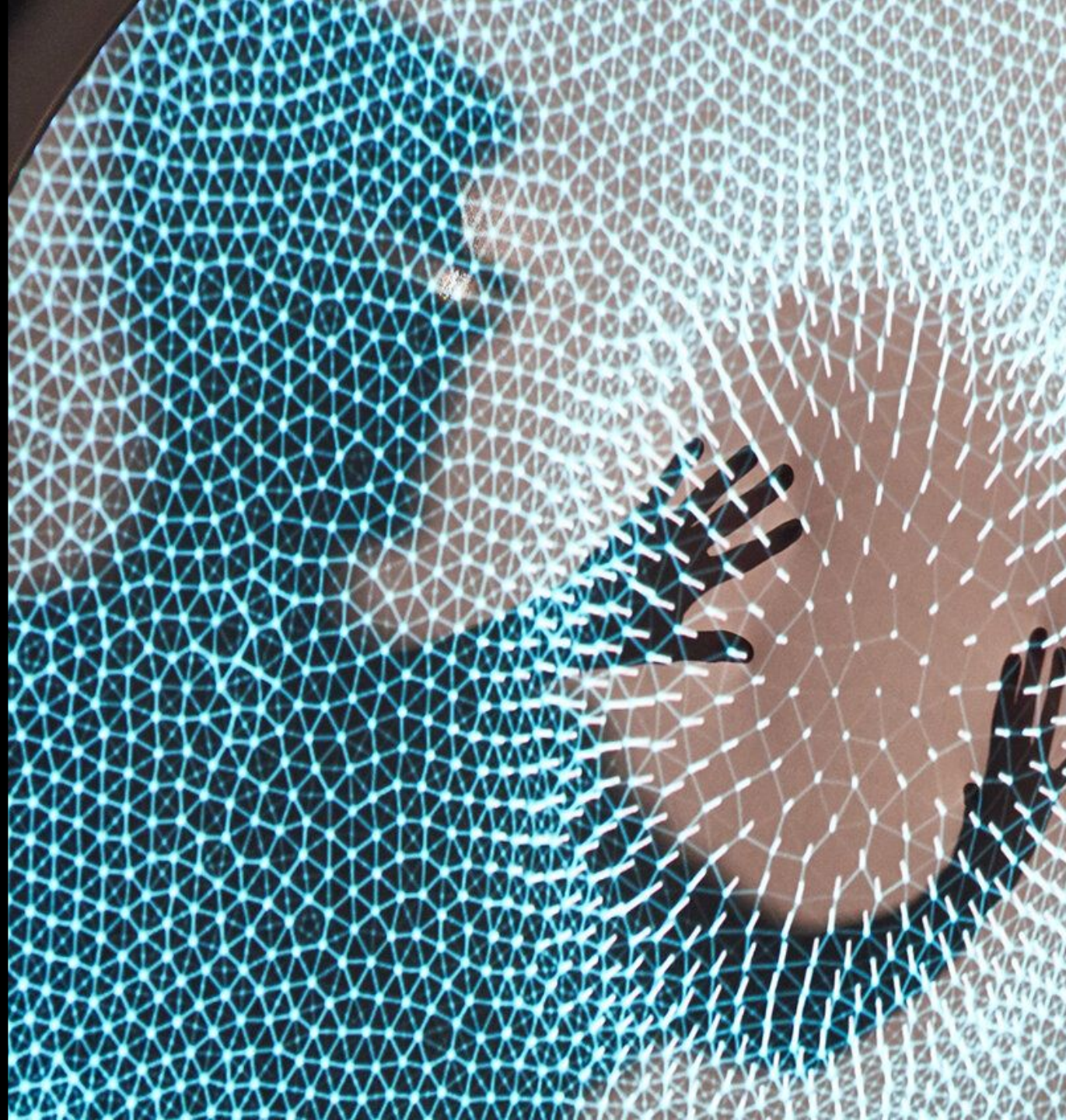
            need to be refined and documented

Undo / Redo

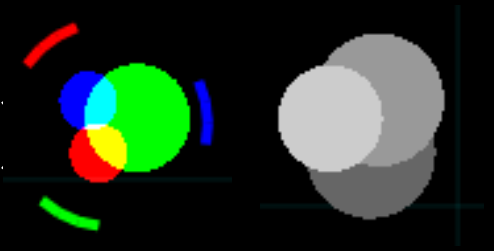
- **Ctrl z / Ctrl y**
- **Deal with**
  - **BU values**
  - **BU size and position**
- **Unlimited**
- **One more reason not to be afraid**
  - **try things then cancel**
- **Shift Paste** Special case (2025 August)
  - treated as a **series of individual actions for now**
  - **instead of a global change**
- **Still some bugs** (2025 August)
  - **we need feedback to correct !**

AAASeed
An introduction
Part 8:
Specialized BU

- **BU_WIZs** (Wizard)
- **BU_MESS**
- **BU_SHOW**
- **Window GA**
- **Window BU**
- **Window GP**



Some **BU_WIZ** (Wizard)



- **BU_ALIVE** **Toggles rendering** On/Off (Click or F3)
- **BU_FPS** **F**rame **P**er **S**econd

FPS also in Flatland (top left): so we can see FPS with no UI

- **BU_TIME** **Shows time** 23 : 26 58
- **BU_EYE** Shows **mouse direction**

- **BU_CAM** Manages **camera editing**

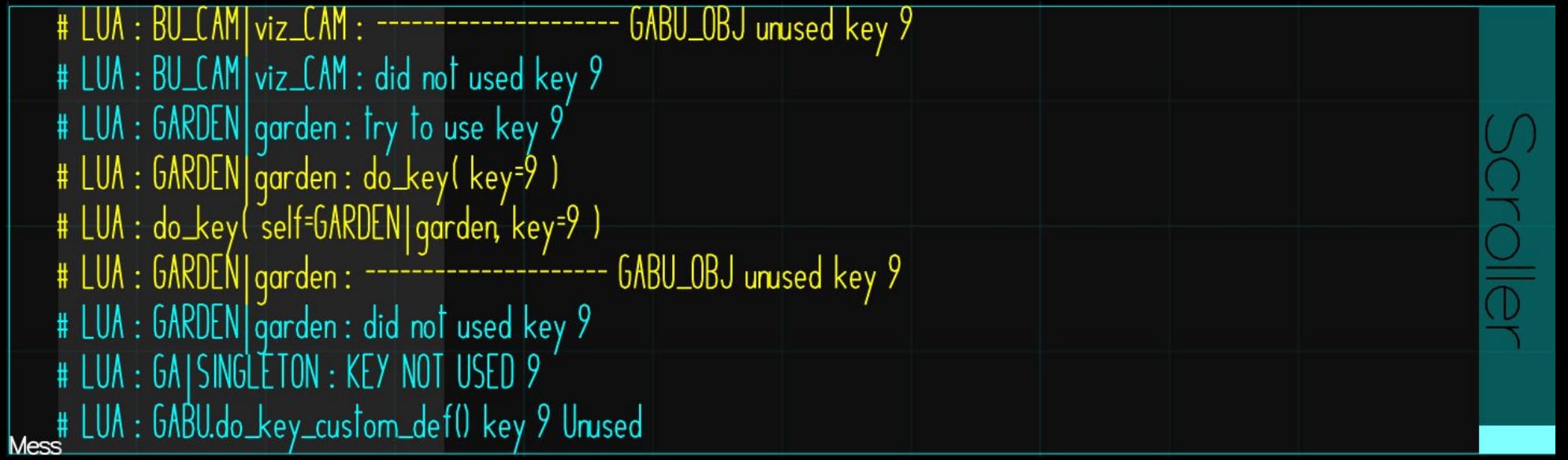
- **BU_SEND** Controls **Ui synchronization** between **machines**

- **BU_MEM** Shows **memory usage in megabytes**
  a problem if it increase continuously

- **BU_POWER** Displays **power and plug status**

- **BU_BLOB** Shows **number of contacts**

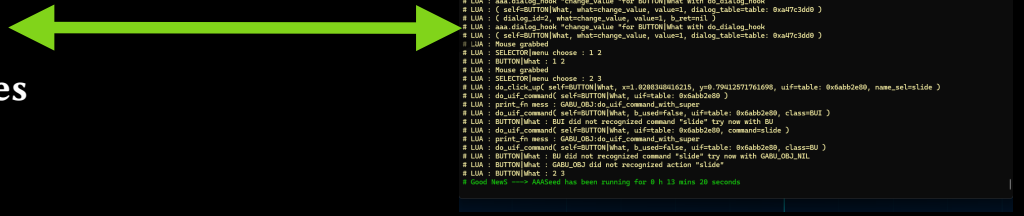
BU_MESS



Displays system messages and errors

Try Double Click

Key m for **(m)essage → pop up terminal window**

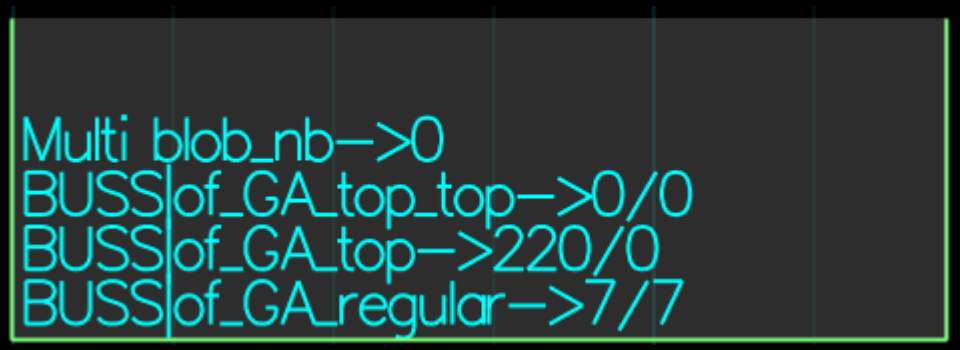


Scroller is a **Slider** to **move** in the history of **messages**

Messages color have a meaning

- **Error**
- **Trackers (devices plugged, sending information to AAASeed: Midi, Camera, Captors...)**
- **Debug**
- **Info**

BU_SHOW (Debug Tool)



More and more **Red** Message for **errors show** there

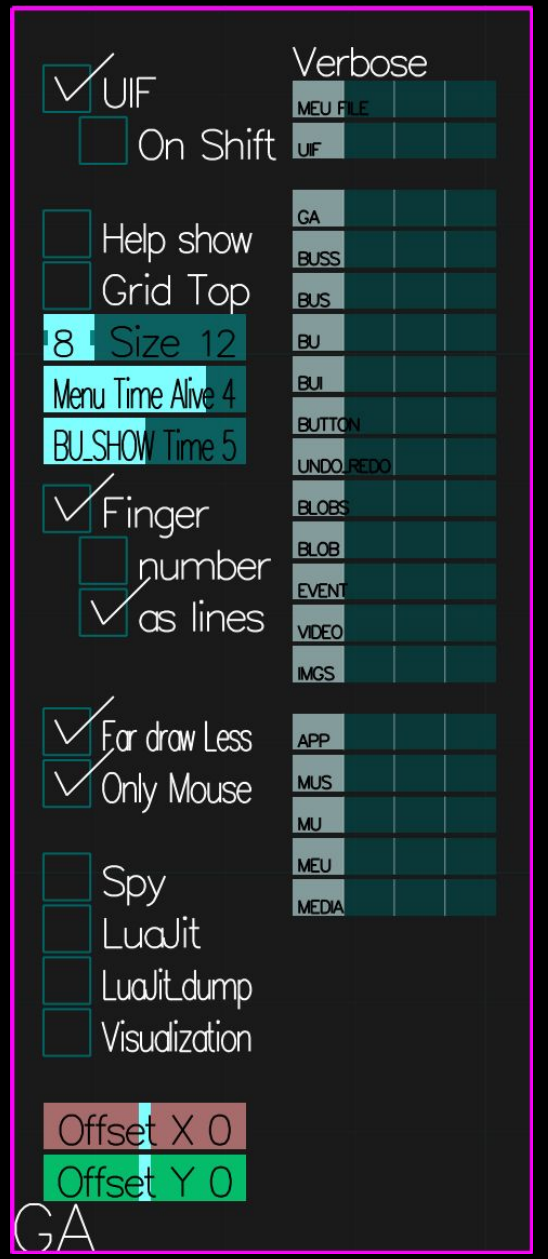
In Lua, to show `name→value` line use

```
aaa.show( value, name )
self:show( value, name ) for objects
```

Window GA first look

- **G**lobal **A**ction settings
- For now
  - **UIF** (**UI** Fast for StarMenu) → enable the **StarMenu**
    On Shift → Enables StarMenu on Shift Click Only
  - **Help Show → same as F1 / Ctrl h**
  - **Grid Top → draw a 8x8 unit grid** on top of the UI
  - **Size → set the 2 sizes used by Ctrl Tab**
  - **Menu Time Alive**
    how long a button menu stay on
  - **BU_SHOW Time**
    how long an element stay in BU_SHOW by default
  - **Finger**
    What we use in the tutorial videos to **display the mouse position**
  - **Far draw Less → simplify** drawing with mouse distance
    a way to optimize UI display
  - **Only Mouse** → discard multitouch input
- **Rest** will be **detailed later,** mainly used by **developers**
  Avoid if you don't know what you are doing

- **Ctrl S, Esc/Esc → Save it**
  file `AAA_Ga.bus` in the APP folder



Window BU

- **B**ox **U**ser settings
- Most of these Options for developer

  graphic debug

  will have a specific tutorial
- Line Width → Text line width

- **Ctrl S, Esc/Esc Save it**

  file AAA_Bu.bus in the APP folder

Window GP

- **GP** come from **G**arden **P**arty

  first time the MEU/MU interface was used, it was during a french company **G**arden **P**arty (Utram).

- Mainly drawing switches

  use for debug or optimization

- Render Chain

  Toggle the display of the render chain (See Part 10 Render Chain)

- Grid Alpha

  transparency of the grid displayed under the UI

  drawn only if superior to 0

- MEU Timings

  Toggle MEU timing measurements

  if an application render a lot of MEUs it could alter the frame rate, and so, setting it to off will make the rendering faster.

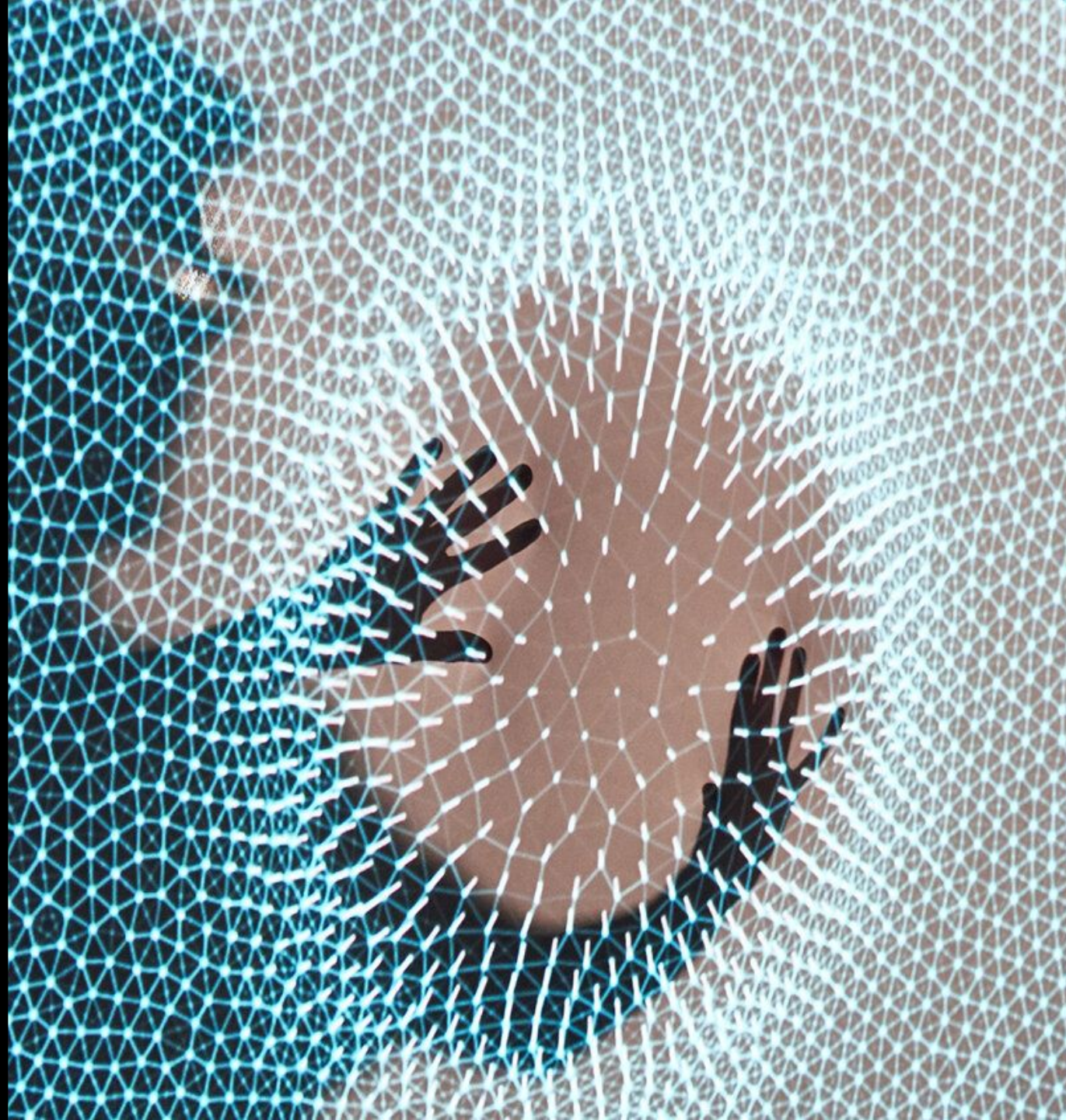
  Also when an application is stable and in exploitation, the MEU timing measurements are just a waste.

- Ctrl S, Esc/Esc → Save it

  file `AAA_Gp.bus` in the APP folder

AAASeed
An introduction
Part 9:
MEU

- MEU Module Editable Unit
  MU Module Unit
- MEU and Uix
- More on MEU
- MEU Bar
- MEU Preset
- MEU StarMenu



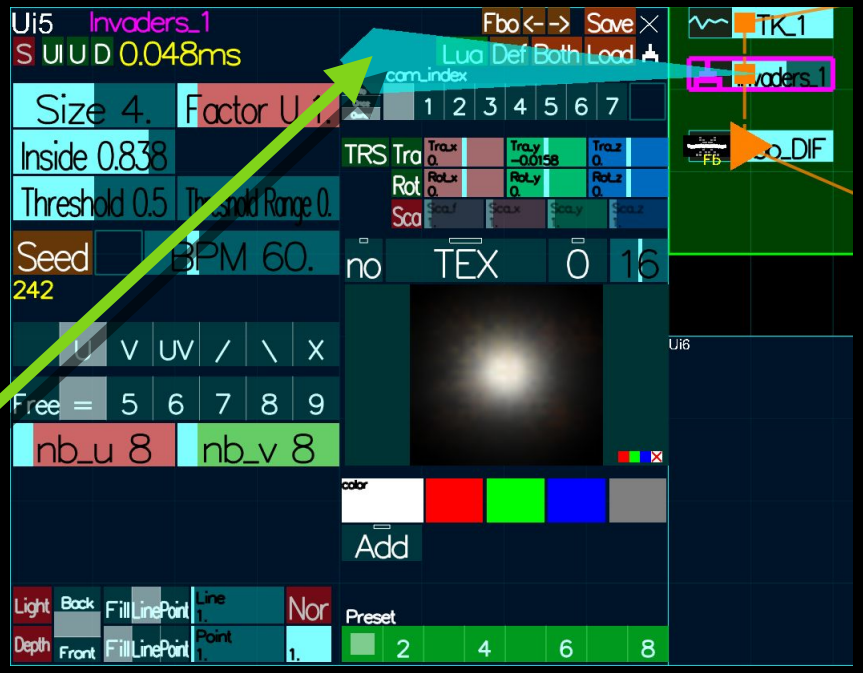
MEU Module Editable Unit
MU Module Unit

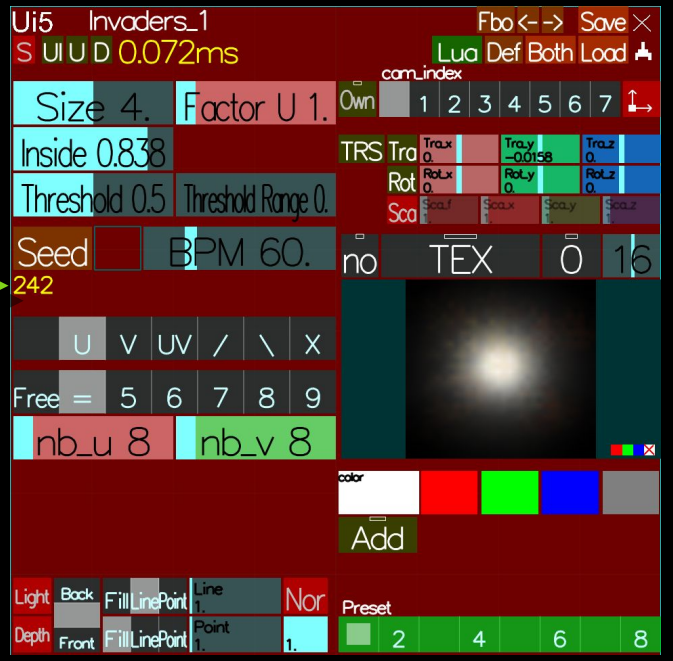
- **The MEU** is the core element to encapsulate and manipulate functionality.
- **MU** compact part of the **MEU**

- **Click** on **icon**
  - → **Drag to move**
  - → **MU** become **current BU**
- **Click** on **slider**
  - → **StarMenu**
  - → **slider** become **current BU**
- **slider value** is the **alpha of the MEU/MU**
  - Slider value **more than 0** → **On**
  - Value control **transparency** when applicable
  - Double Click → slider edit dialog
- **State and Position** of the **MUs** control the rendering process
  - see next chapter
  - vertical position first then horizontal position:
    - **bottom to top then left to right**

MEU and Uix

- Click on **MU icon**
  - → open **MEU** interface in **Ui5 / Ui6**
    - **Ui5** is the default
    - **Ui6** is the default for **MEU DIRs**
- **Link shows corresponding MEU / MU**
- **MU StarMenu** to choose Uix
- **MEU StarMenu**
  - **click on backgound of Uix**
  - **nearly the same as MU StarMenu**
- Close **BU** at top right
  - detach MEU from its Uix window
- Red Background ↔ not rendered





- Uix are technically **BU_MEU**
- Drawing change with distance
  - this is a speed optimization

More on MEU

- **MEU** is a **module** of functionality,

  in computer terms it is an **object**

  it **usually renders** but can d other tasks:

  receives/send data

  analyses image

  control a device (e.g. plotter, projector, Dmx, Arduino...)

  ...

- **2 main methods** (functions) are called every frame by a **render() method**
  - `update()` prepare so draw will be as fast as possible
  - `Draw()`
- **1 method** is called when the **MEU Ui is visible**
  - `update_ui()`

MEU real nature, a peek for now

- It is a **Lua object**
  - Name is `MeuType_InstanceName`
  - **a lua Script for each Type** (people say also class or prototype)

- It can uses **C++ AAASeed Objects** (c_obj_ui)
  - c_layers or c_module most of the time
  - Accessible via its flatland parameters and some dedicated lua methods
  - **Focus Button in StarMenu**

- It lives in a **directory**
  - Everything is readable and can be edited
    - less and less needed
    - but some like it
  - **Dir Button in StarMenu**

MEU Bar

- TutoBU_1 **Title** (white or Violet if MU is current BU)

  Meu's name made of **type** (left) and **instance** (right):

  TutoBU_1 means **MEU of type TutoBU instance 1**
- S UI U D **buttons**

  Switches to activate/deactivate call to methods

  Send, update_**UI**, **U**pdate, and **D**raw
- 0.032ms **Execution time** in millisecond
- BaseMore ... is a SELECTOR named TAB

  switch between different block of MEU **Ui**
- **Close** button **detach** the **MEU** from its Uix

MEU Bar

- Lua **Opens the MEU's lua** script in your associated text editor
- Load **Loads** only this m**eu** state
- Save **Saves** only this m**eu** state
- Def Trigger a **Def**inition, in fact a **redefinition** of the **MEU** (its Ui in particular)
- Both Trigger **Both** a re**Def**inition and a **Load**

- Fbo Open the used **Fbo** (more soon on Fbo)
  in the previous **Uix**
- <- -> lets you navigate in the render chain (more soon)

MEU Preset

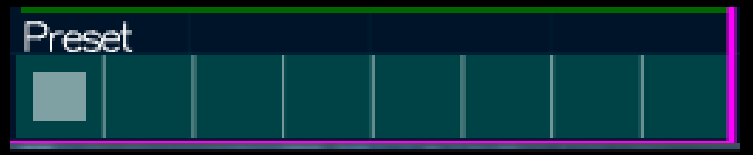
- At the bottom right of the **meu**
- **Load/Save the state of a meu**

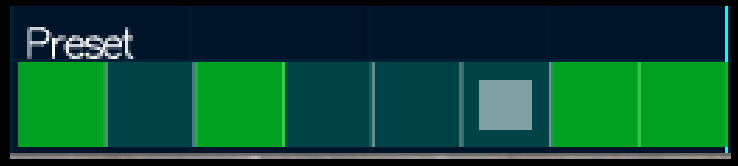
  in fact load/save the values of meu's **BU**s

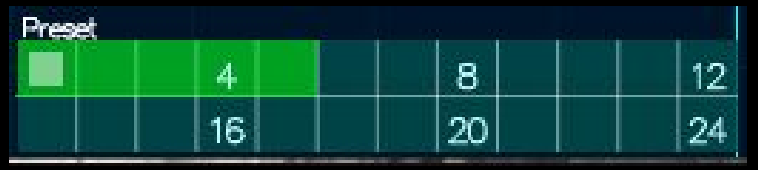
  not always all, at the author discretion
- **preset defined ↔ green color**
- **Click → Load**
- **Ctrl Click → Save**
- **Ctrl Alt Click → Delete**
- Fixed number by MEU Type

  defined in the code (2025 August)

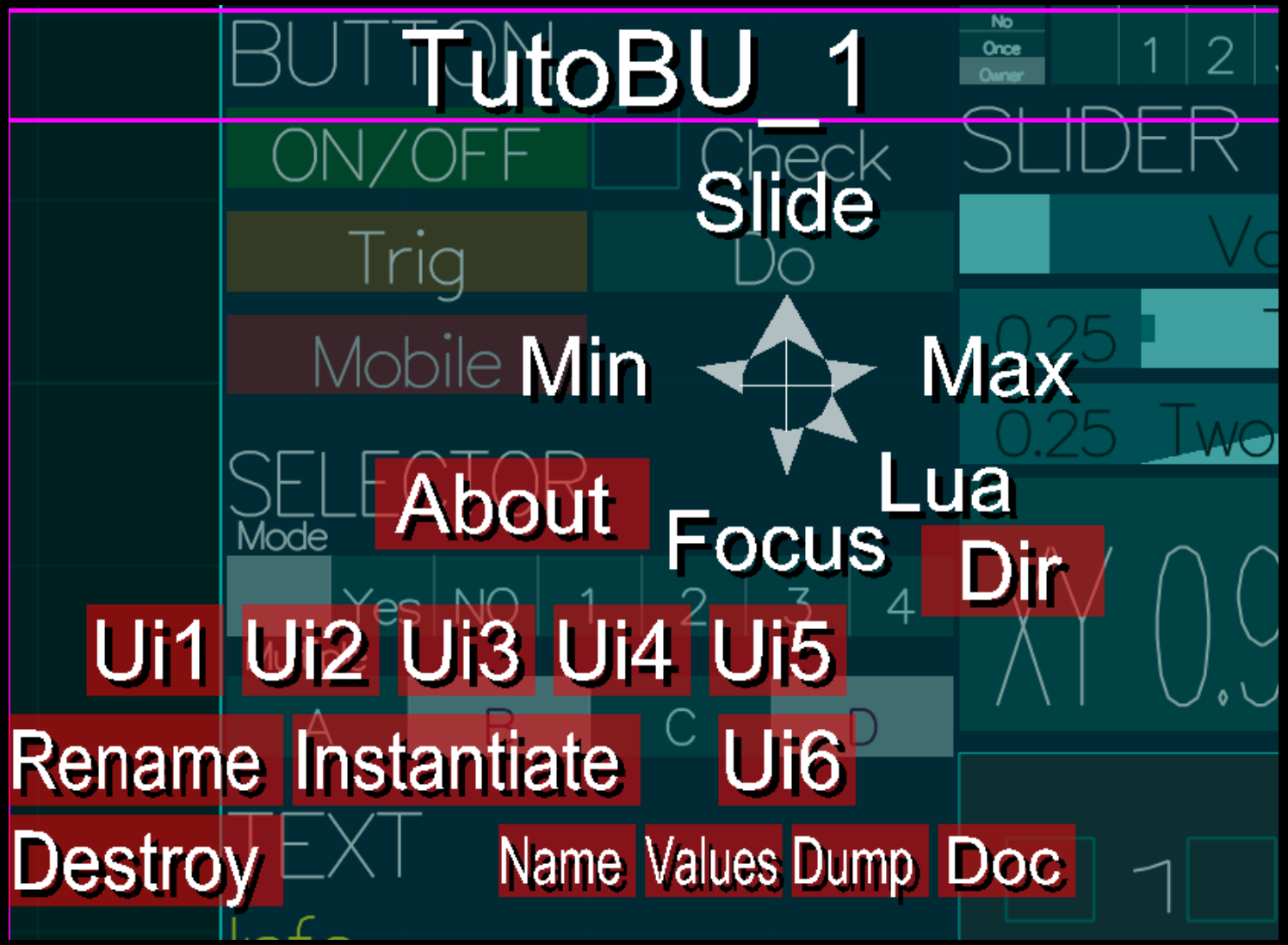
  Developer Note: here the code is `meu:get_preset_nb() return 24 end`







MEU StarMenu



- **Click MEU background or MU slider**

  Slide

  → **Adjust the alpha**

  → control the **MU Slider**

  Focus

  → Access to **Flatland**

  C++ part of the MEU

  Lua

  → Access to the **Lua script**

  Using **default editor**

  Dir

  → Opens the **Instance folder**

  Uix

  → Choose which **Uix window get the MEU**

- **Described in Part 11**

  Rename

  Type can't be changed

  Destroy

  with Confirmation Dialog

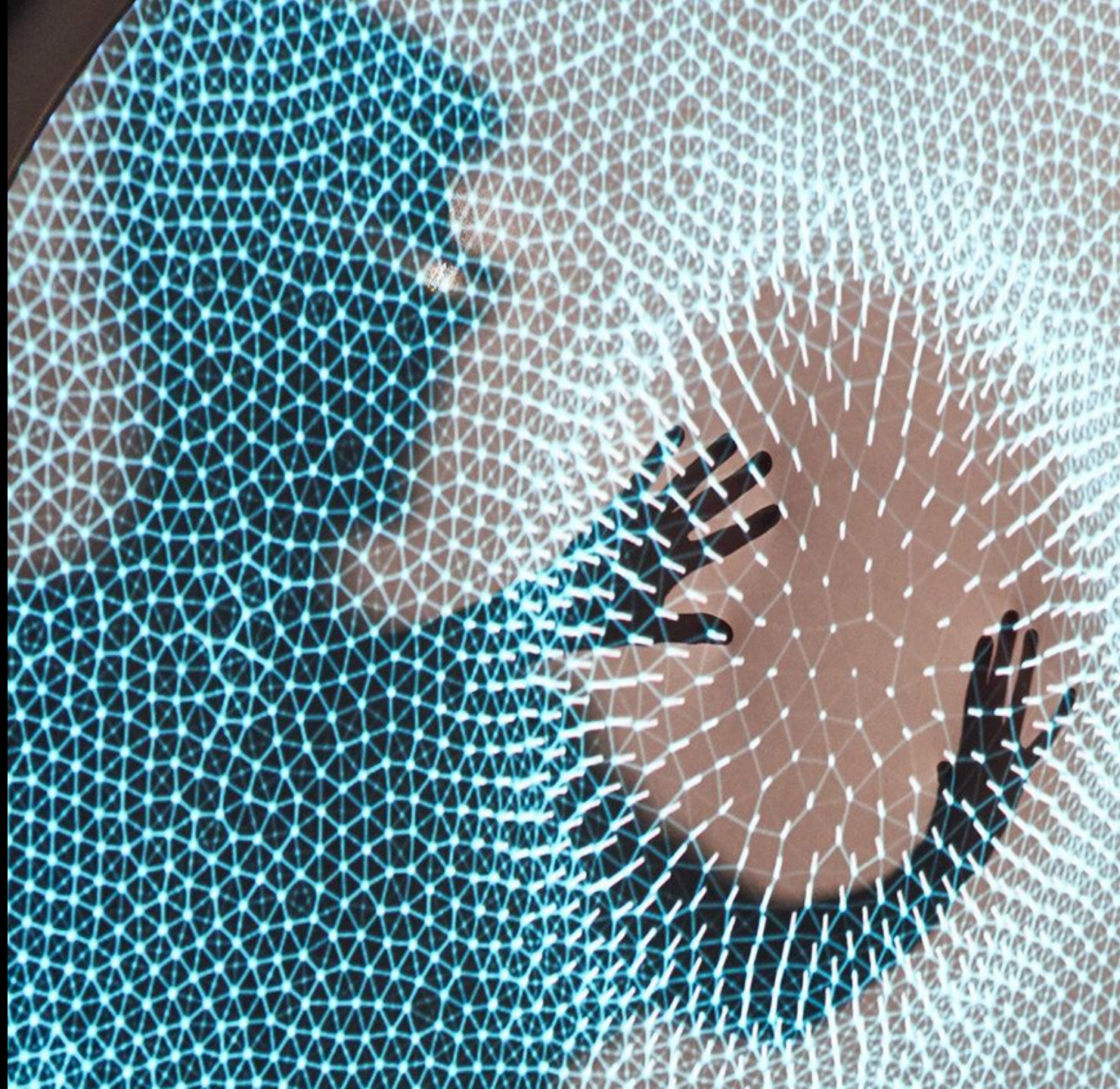
  Instantiate

  Duplicate the MEU/MU

  Type can't be changed

AAASeed
An introduction
Part 10:
Render chain

- Render chain
  - **Order**
  - **Alpha / Opacity**
  - **Visualization**
- BU_RECT
  - **Order**
  - **Value**
  - **StarMenu**
  - **Move**

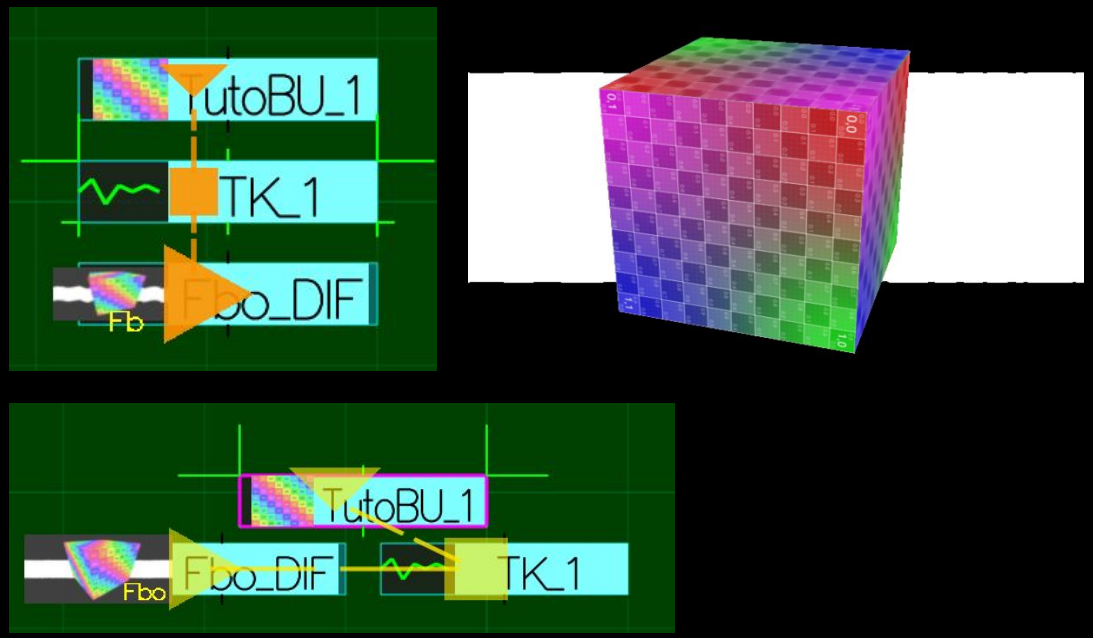


Render chain: Order

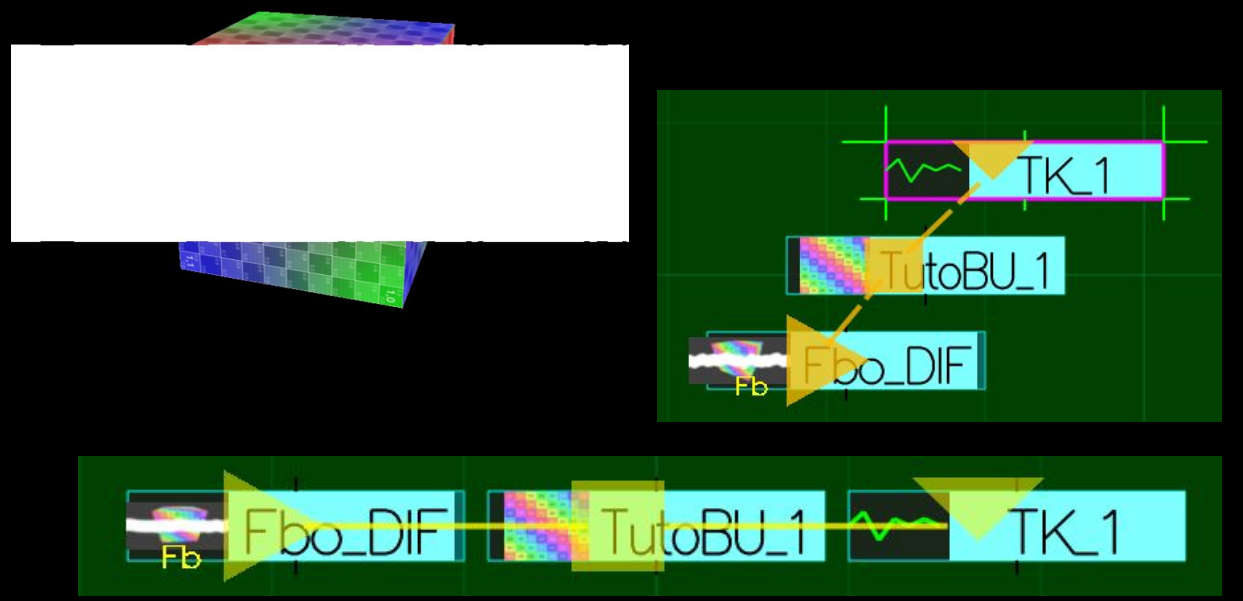
- The **render chain** is the **order** in which all the MEUs in your application are executed.
- The **positions** of the **MU**s control the **execution/rendering order:**

  bottom to top, then **left to right**

TK_1 rendered first, then TutoBU_1



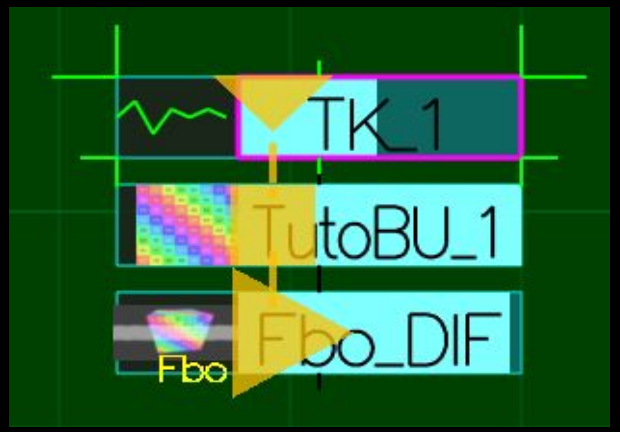
TutoBU_1 rendererd first, then TK_1

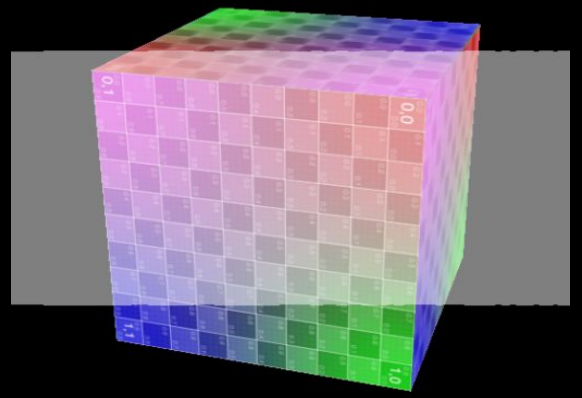


Render chain: Alpha/Opacity

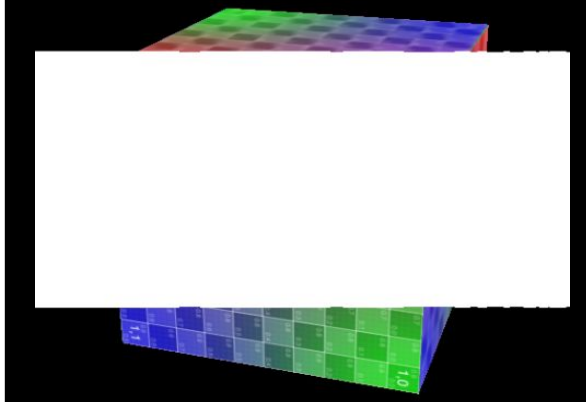
- **mu slider value is the Alpha of the meu's rendering**
  - **Alpha 1**
    → 100% opaque, meu is On
  - **Alpha 0.75**
    → 75% opaque same as 25% transparent, **meu is On**
  - **Alpha 0**
    → 0% opaque same as **100% transparent, meu is Off**

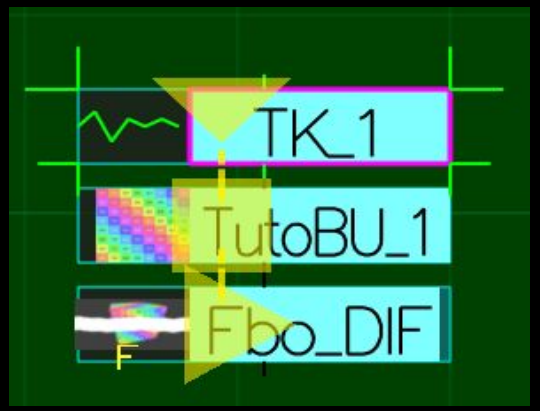
TK_1 is 50% opaque





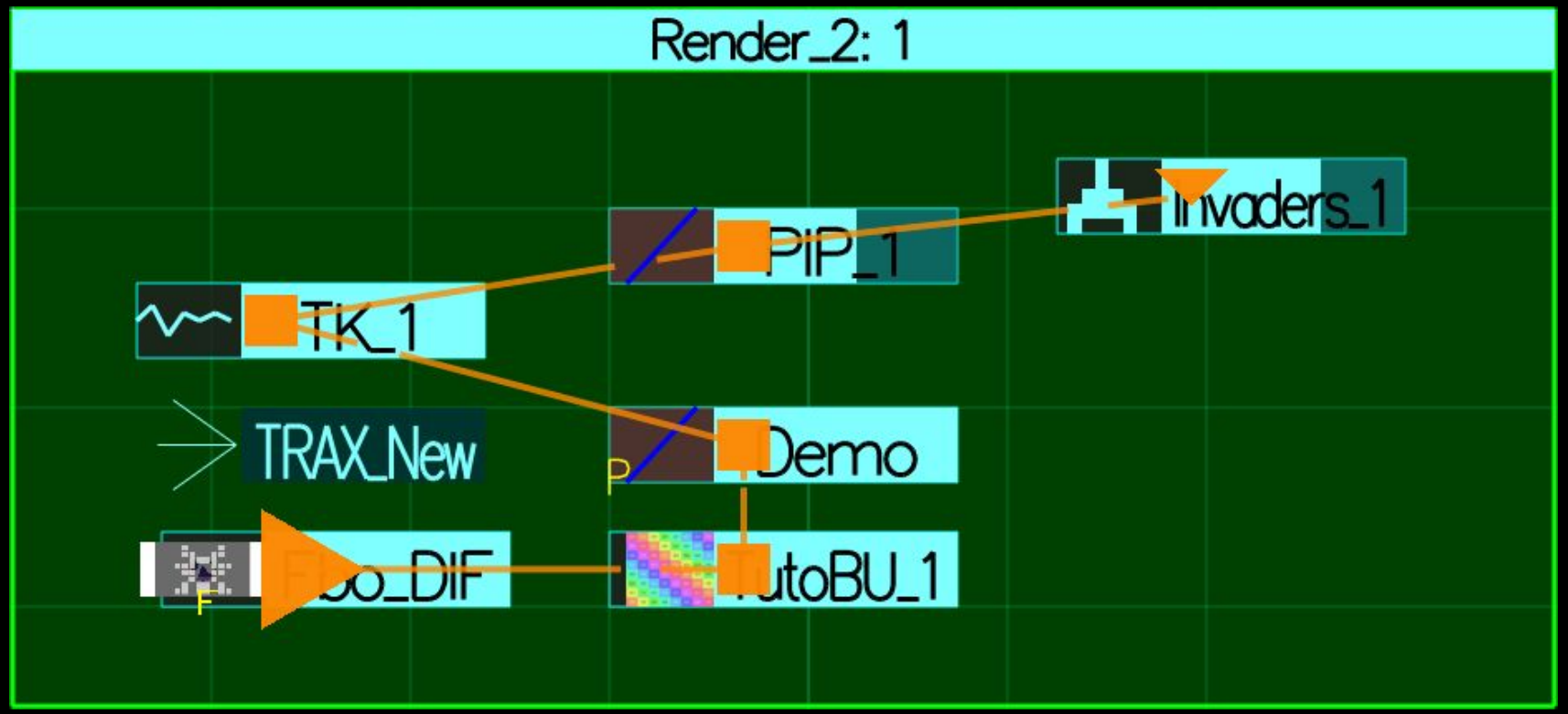
TK_1 is 100% opaque





Render chain: Visualization

- An Orange line shows the render chain
- **Just a visualization not a cable !**



BU_RECT Order

- A BU_RECT is a container that holds a group of MUs. It acts as a single control for the group.
- First: Order of the BU_RECTs

  the number in the name

  to change it

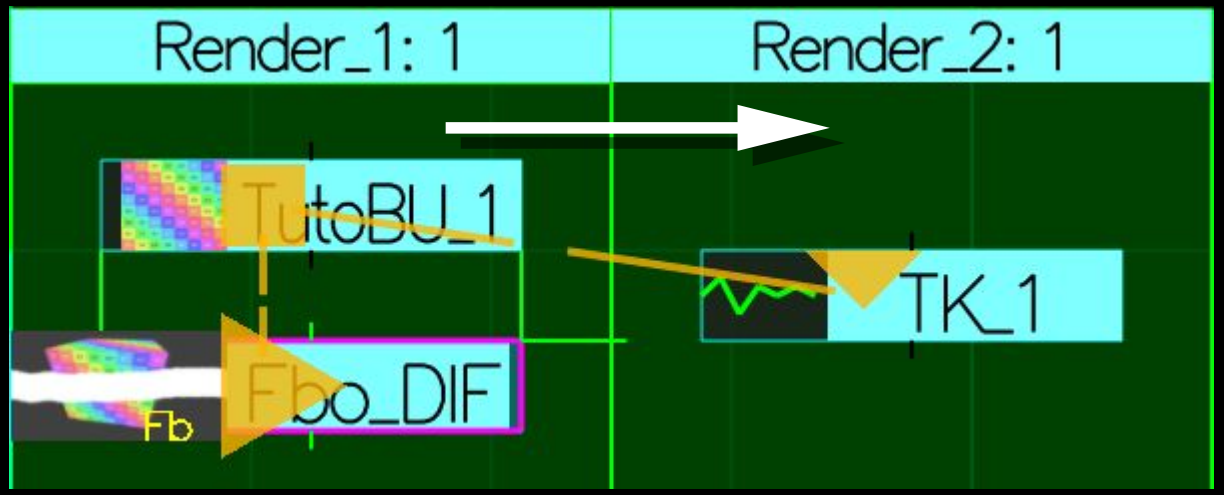
  StarMenu

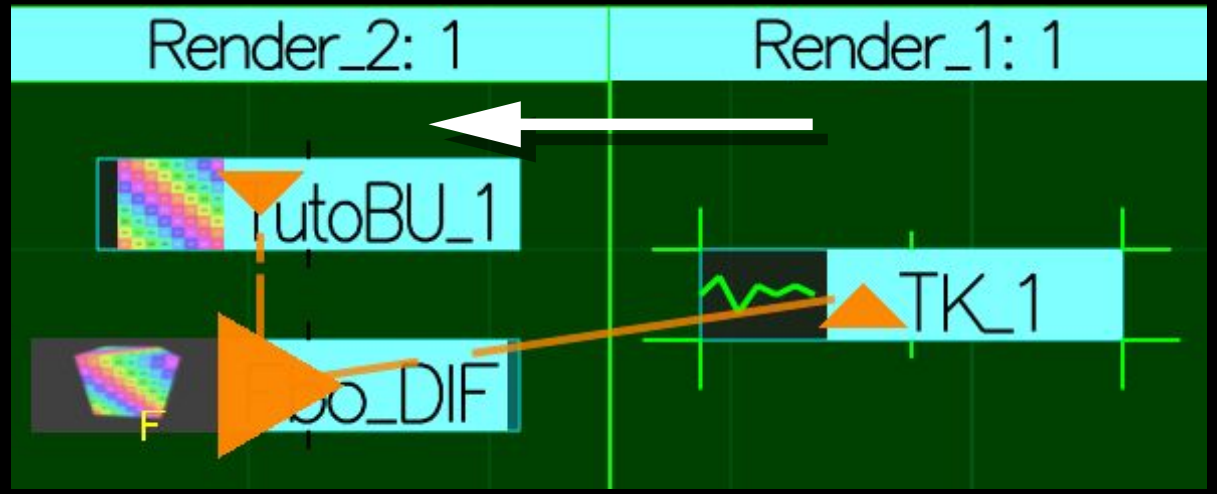
  Keyboard Ctrl Up / Down
- Second: order inside BU_RECT

  Bottom to top

  then

  left to right





BU_RECT Value

- Control all mu inside:

  it multiply their Alpha.

  Act as a group Alpha.

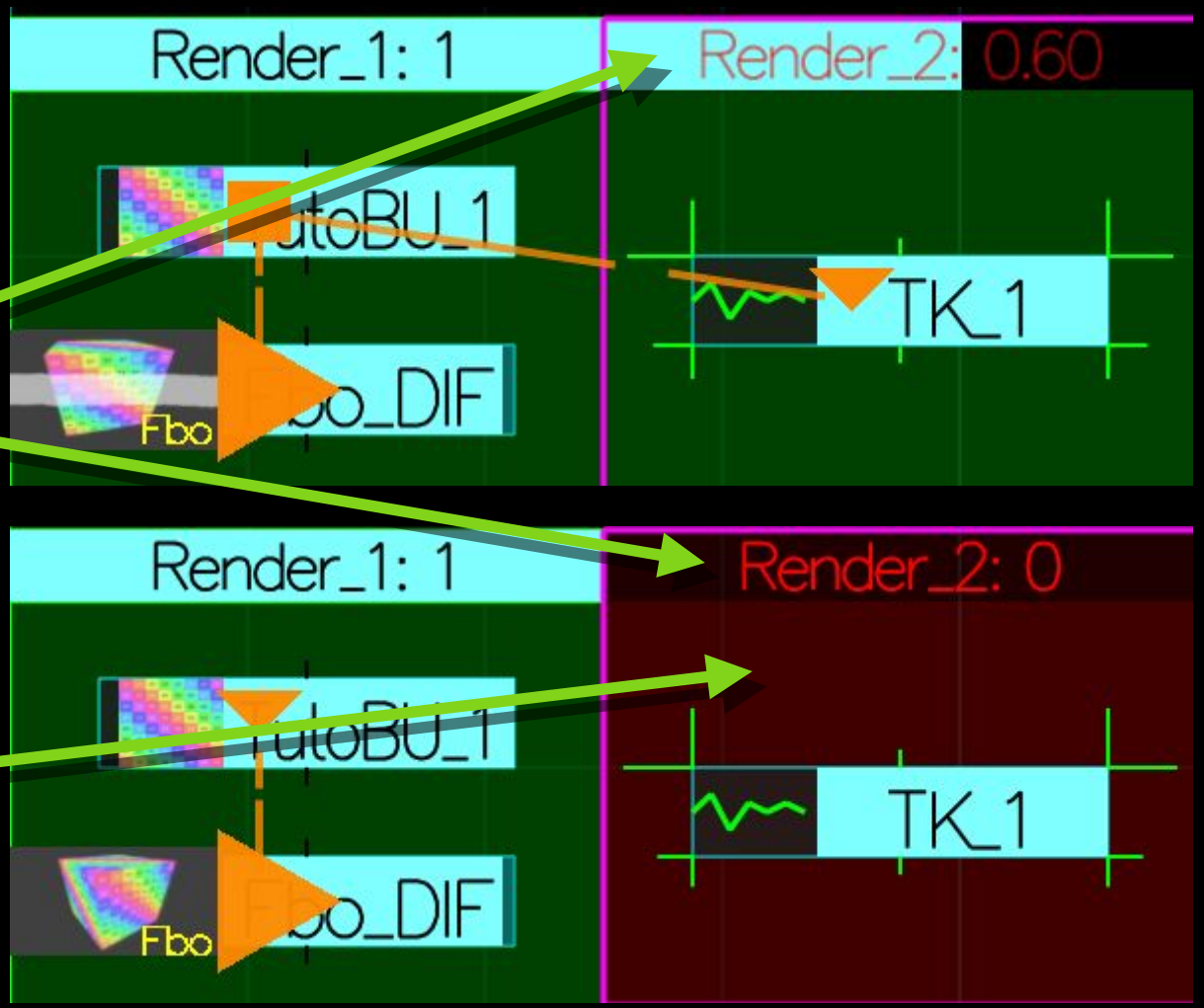
- Alpha different from 1

  → red text

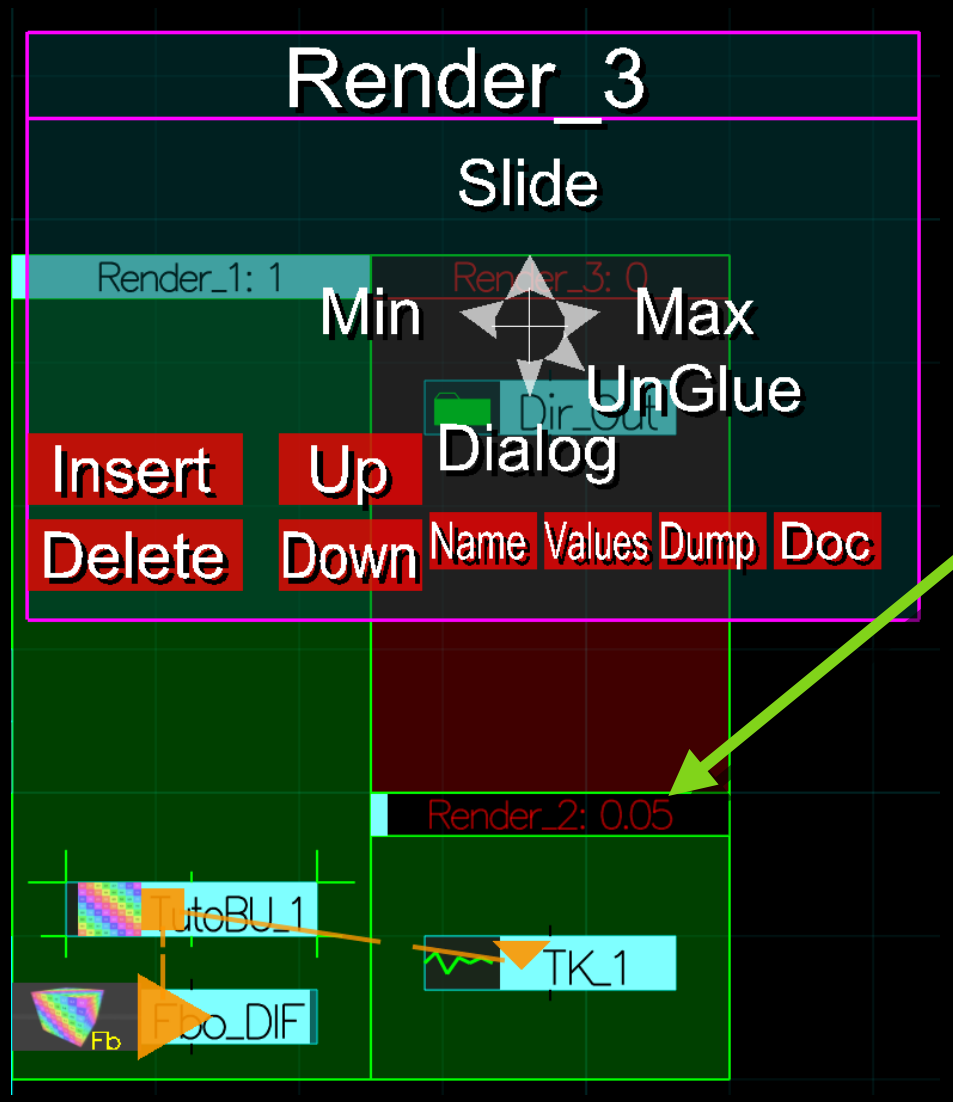
- inferior or less then 0

  no mu rendered

  red background



BU_RECT StarMenu



- **Slide** to change value

  value is Alpha for BU_**RECT**

  shown like a Slider at the BU_**RECT** top

  Red when not 1

- **when current BU, receive keys**

  same keys as a slider

  Ctrl Insert / Delete → Insert / Delete

  Ctrl Arrow Up / Do → Up / Down Order

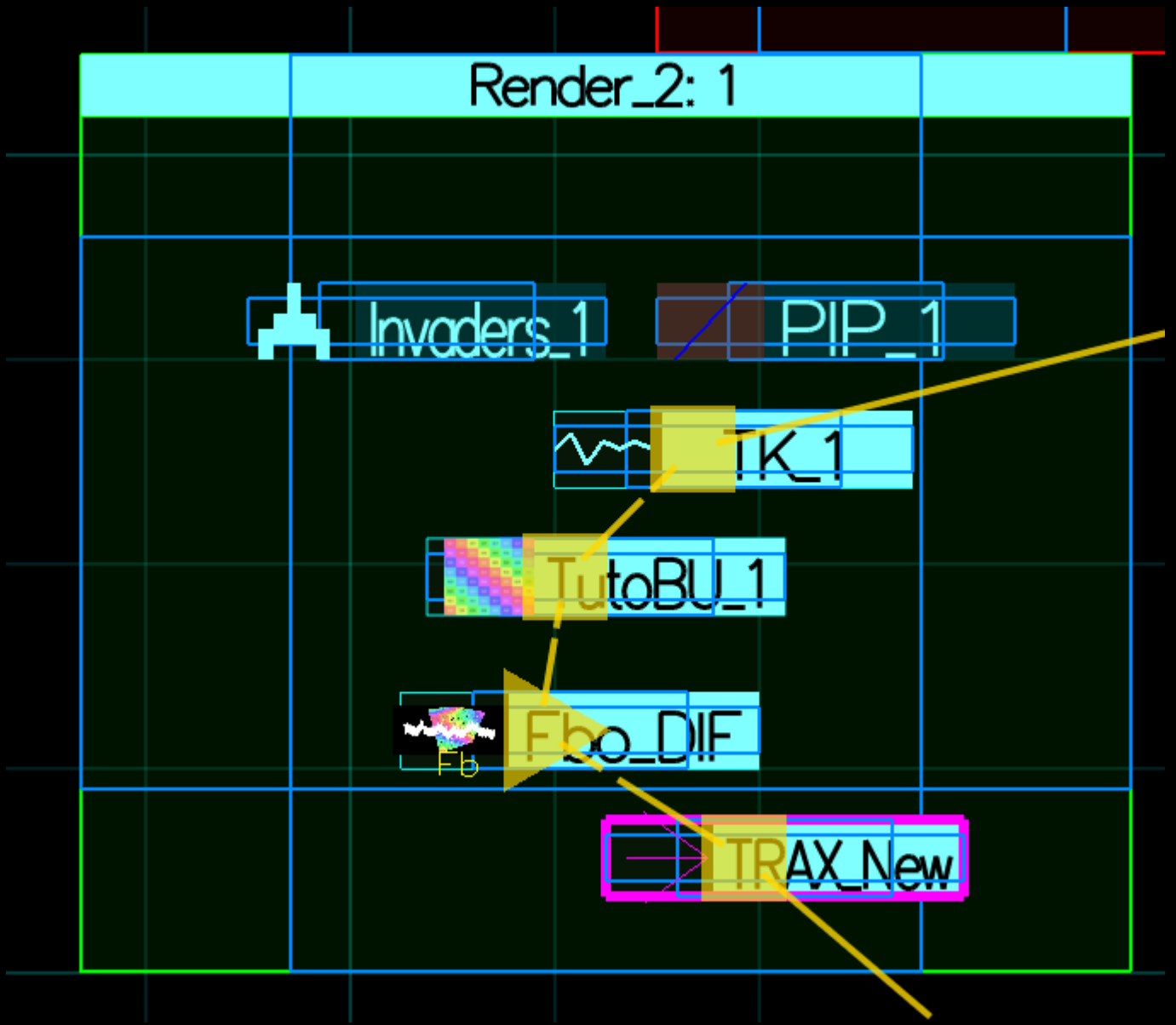
- **Glue / UnGlue**

  Affect MUs inside when moved (next slide)

BU_RECT Move Resize

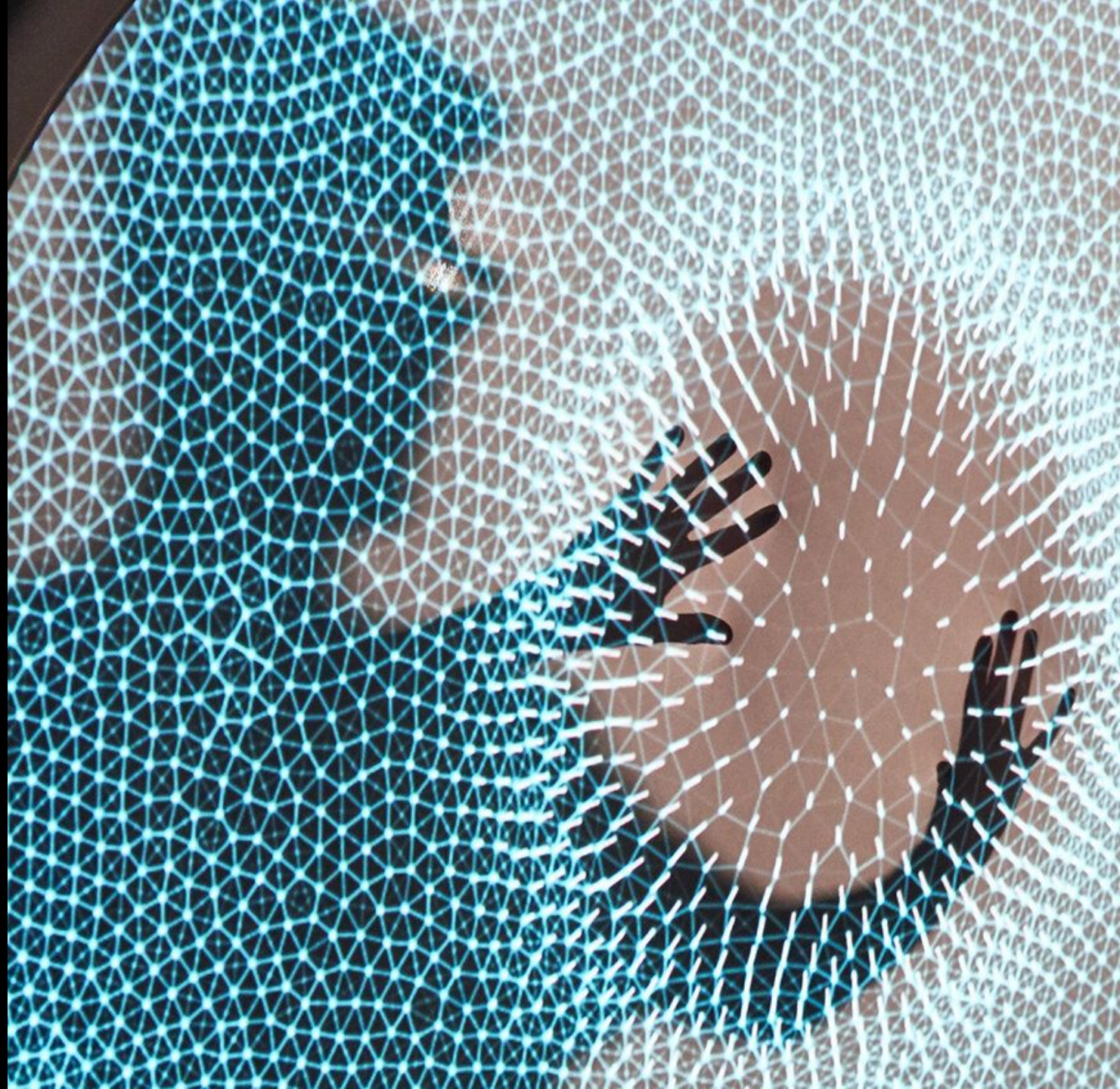
- Move Resize as always
  - Hold Alt
    - Drag in Zone
    - Keys *+ / - and Arrows

- Mu inside BU_RECT
  - center of Mu inside
  - On Move
    - Glue mode
      - Mu move
    - UnGlue mode
      - Mu stay in place
  - On Resize
    - Mu stay in place



AAASeed
An introduction
Part 11:
MEU manipulation

- Seeing MU
- Finding MU
- Moving MU
- MEU_DIR
- MEU name
- MEU Instance operation
  - **Rename**
  - **Destroy**
  - **Instantiate**
- Meu Save
  Save All
- Create New APP



Seeing MU

- **3 Buttons to select** what **MU are drawn**
  - Simplify the display while keeping Mu around
  - These **buttons** are **movable**
  - **Unused Button Position is special**
    - **New meu appears under (more later)**

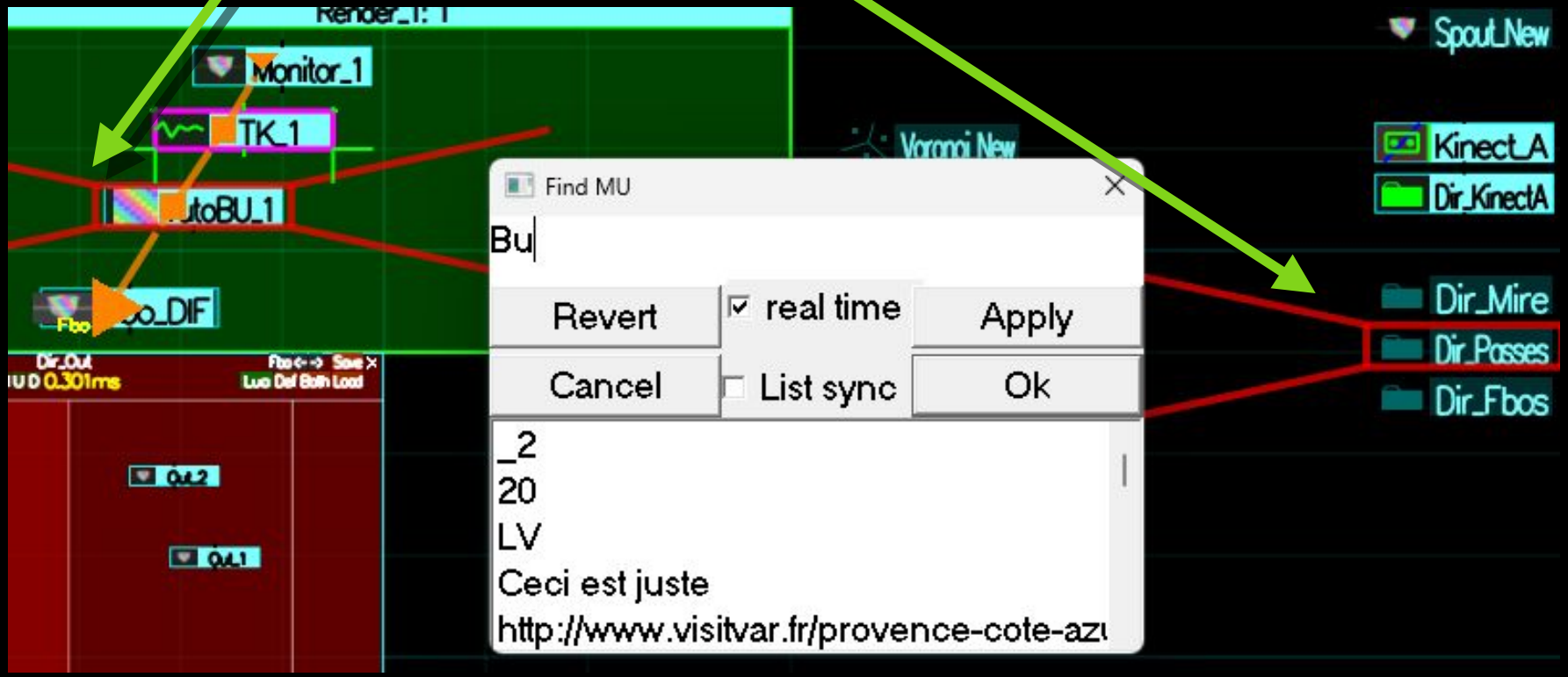
- **Hidden** button **controls display** of **MU with hide attribute**
  - **to change MU hide attribute**
    - **MU StarMenu Hide/Unhide Button**
    - **Shift Ctrl** on **Icon**
  - **Hide On → red background on MU**

- **Unused** button **controls display** of **MU** unused (not rendered)
- **Used** button **controls display** of **MU** used (rendered)

Finding MU

- **Ctrl F → (F)ind MU dialog**
- **highlights matching MU or folder containing matching MU**

  matching is case insensitive inclusion of text in MU



Moving MU (reminder)

- Move Resize as always
  - Hold Alt
    - Drag in Zone
    - Keys *+ / - and Arrows

- Move by dragging the MU Icon

- Move by moving containing BU_RECT in Glue mode

MEU_DIR

- Encapsulates other MEUs
  - regroup
    - simplify the display,
    - while keeping MU around
- It have a local Render chain
  - same order as for BU_RECT:
  - Bottom to top then left to right
- Open in Ui6 by default
  - More easy to navigate the MU inside MEU_DIR
  - They open in Ui5 so the MEU_DIR Ui stay open
- No BU_RECT inside
  - a central green area
  - 2 optional areas A and B with a switch
  - rest is storage for MU

- Drag MU out → move MU Out
- Drag MU in → Move MU In

- MEU_DIR use a local folder AAA_MEU to store its MEUs

MEU name: Type_Instance

- **Structure** of **MEU name** is

  MeuType_InstanceName

  first '_' separate Type and **Instance**

  we can say Type_Instance for simplicity
- **Each Type** (we say **class** or **prototype** too) have its **own Lua Script** and so its **own interface** and **behavior**.
- **Each Instance of a Type is a lua object** (it have it's own data) **use the same lua script: one lua script by meu Type.**
- **Only letters, Numbers and underscore**
- The Meu have a corresponding folder in the file system using the same name Type_Instance.

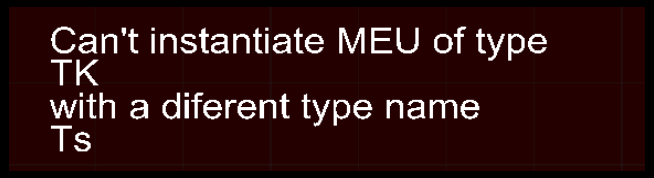
  So **Meu name have to be unique in a same directory**

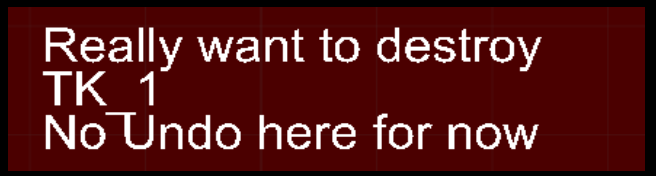
  StarMenu "Dir" to open it in the file explorer

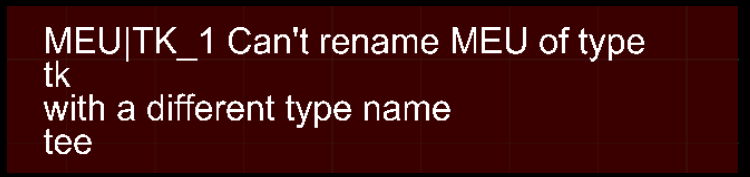
  for example you will find the preset file there

MEU Instance operation

- **StarMenu**
  - **Rename**
    - **change the name of the Instance**
    - Type part can't be changed
  - **Destroy**
    - **delete permanentlt the instance**
    - **with Confirmation Dialog**
  - **Instantiate**
    - **Duplicate, create a copy with another name**
    - Type Name can't be changed







- Drag by the icon and hold Ctrl when releasing the mouse Button ⟶ Instantiate
  - In the same folder
    - an instance is created adding the number of instances of this MEU type to the name
  - In a different folder
    - a new instance is created with the same name that the original

MEU Save

- **Button Save** at the **top right of MEU bar**

  Save this Instance of the MEU

  - **the C objects (c_obj_ui) associated with the MEU**

    in file fx.aaa_layers_all

  - **The state of the BU making the interface of the MEU**

    in file preset_0.plua

    other preset are saved or deleted at the time the action is performed on preset

  - **Whatever associated data the C object or the Lua deal with**

- **If MEU is a MEU_DIR all instance inside are saved too**
- **It is an unusual strategy but it prouved very useful**

  you can experiment and save only what you want

  eventually use Load on some MEU to reset them to their saved state

- **Button Save All**

  Can be anywhere (this is a mobile Button)

  Same as doing a Save on every MEU instance in the App

  Useful when you want to make sure to save everything

- **Do a Ctrl S or a Menu/Save Globals or Quit with Double escape**

  → save the rest:

  the global level everything not in a MEU

Create New APP: Duplicate folder

- **APP are stored in a folder**
- **Example: duplicate APP_Garden_Base**

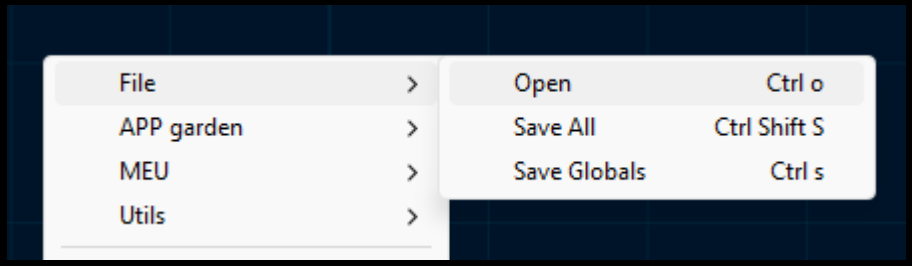
  Copy AAAAPPs\Tuto\APP_Garden_Base

  Into APPs_Guest

  Rename APP_Garden_Base

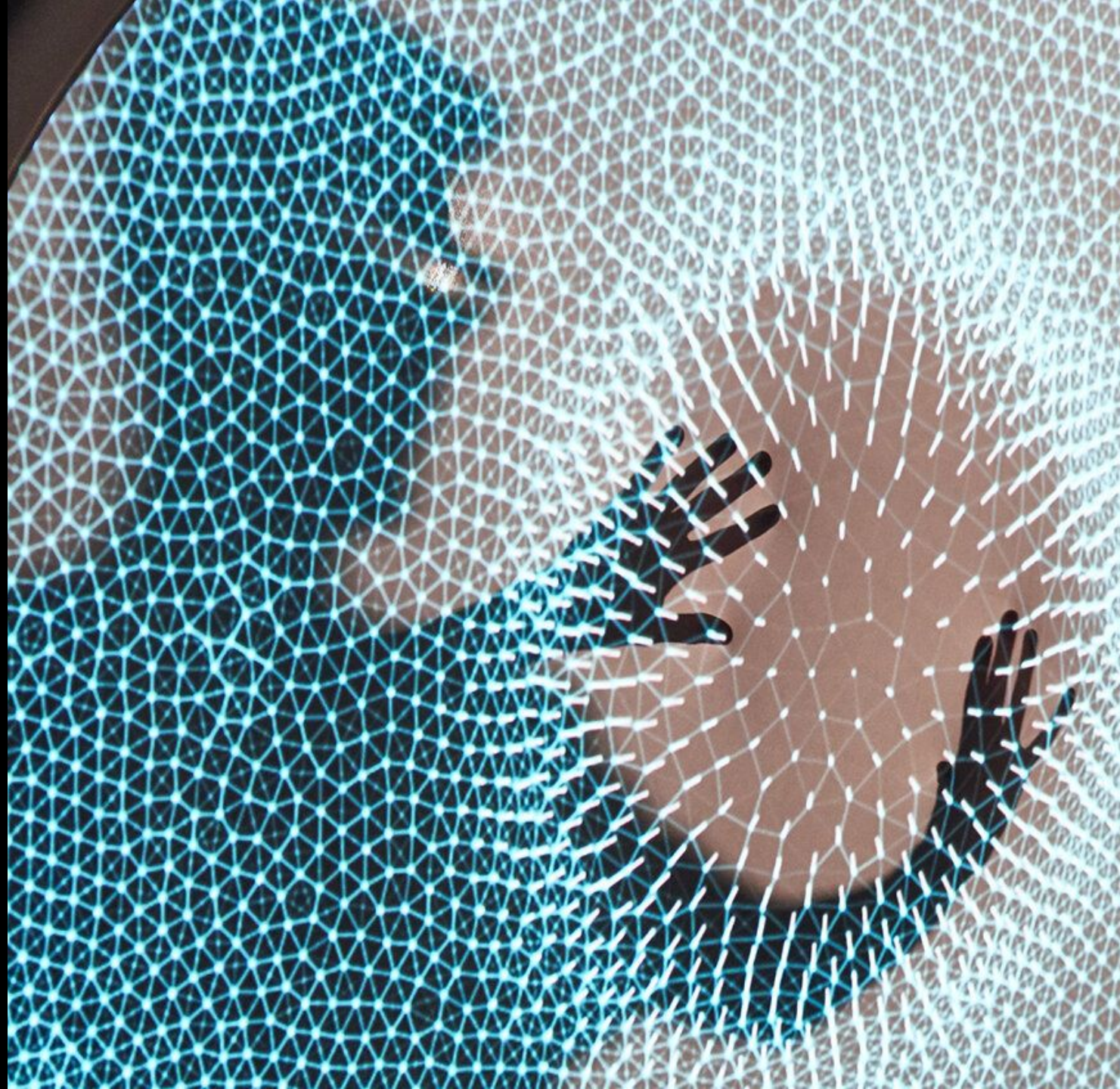
  Open AAASeed

  Open renamed **APP**

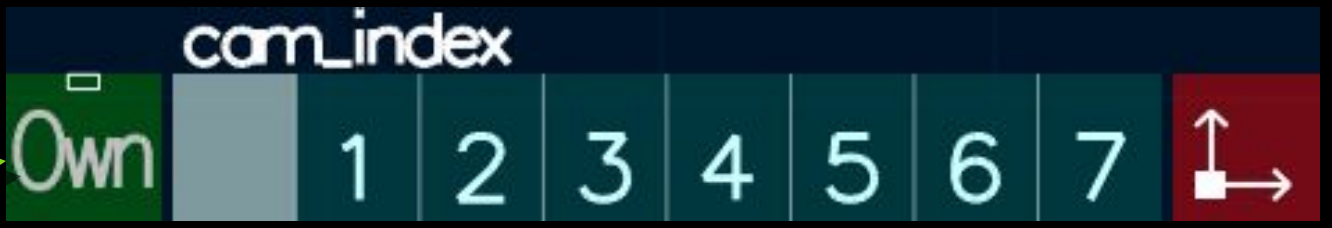


AAASeed
An introduction
Part 12:
Cameras & Axe

- MEU's Cameras
- Camera Selector
- Axes Units
- Rotation
- Camera Edit
- Cameras Params

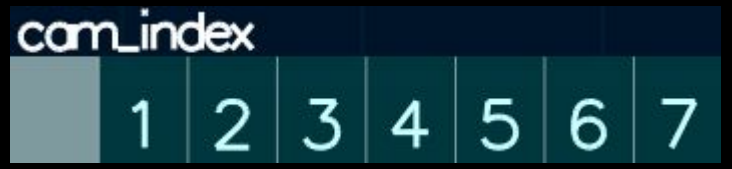


MEU's Cameras



- **No / Once / Own**
  - **No → No camera defined: use current camera**
    the last one defined in the render chain (**Own** see below)
  - **Once → use camera only for this MEU**
    then go back to current camera
  - **Own → Own the camera**
    it becomes the current camera
    for this Meu and the next Meus in the render chain

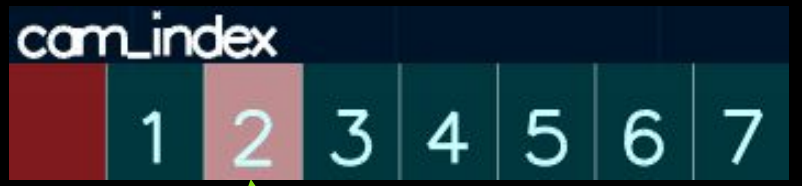
- Camera selector



- Button **Axe**
  Toggle Axes

- Reminder: StarMenu to see the BUs name

Camera Selector



- 8 cameras by default, 16 sometimes

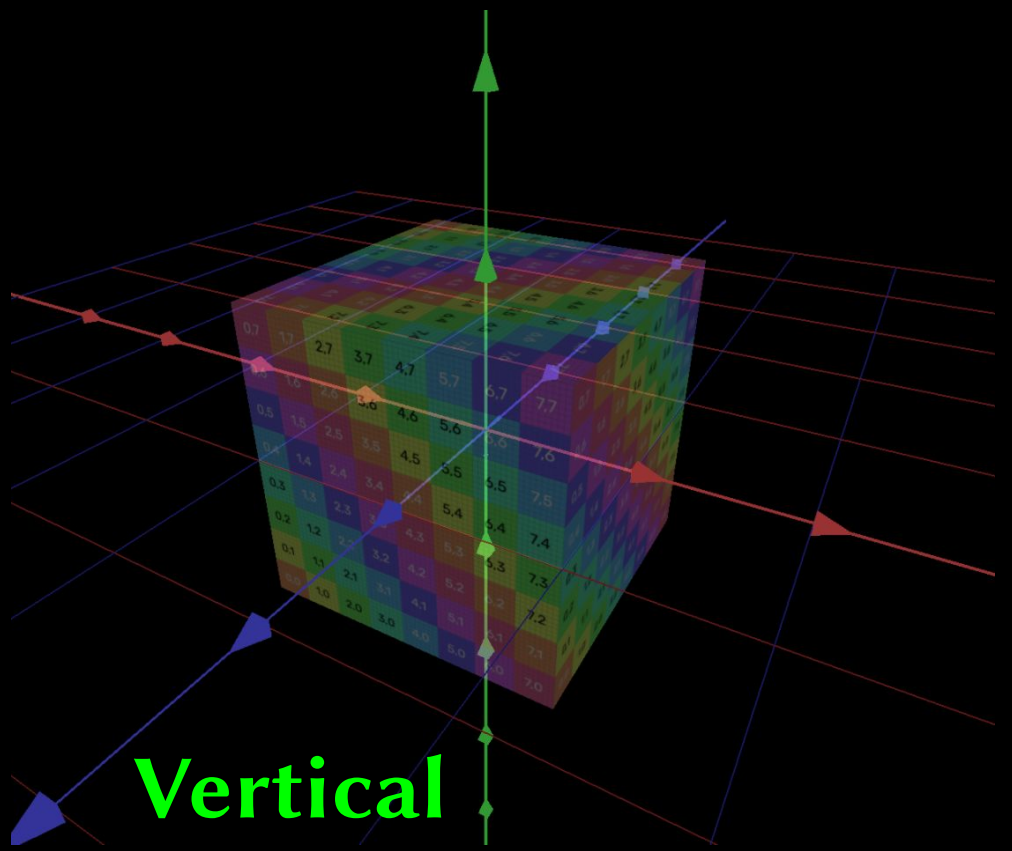
- Click → Select camera
- Ctrl Click → Copy the last camera clicked
- Ctrl C/Ctrl V → Copy / Paste
- Double Click → Edit in flatland
- Shift Click → Flip Lock / Unlock

  Locked camera are shown with a red background

  Locked camera can't be edited with mouse and keyboard only using flatland.

Camera Axes Units

- **Right Hand** System
  like OpenGl
  not left hand
- Z in your **face**
  2d : XY facing you
- **X|Red** **left to right**
- **Y|Green** **bottom to top** **Vertical**
- **Z|Blue** **back to front**
- **No unit: Mathematics** not physics
  Back of the pyramid on axes aligned with the unit



Rotation

- Unit is Turn / Revolution

  No radians, degrees or gradians.

  Canonical aspect

  [0,1] map full circle

  1 → full turn

  0.5 → half turn

  0.25 → quarter turn (counter clockwise)

  –0.25 → quarter turn reverse (clockwise)

- Rotations use trigonometric direction (Counter Clockwise)

Camera Edit

- **Middle Click → Start Editing**

  BU_CAM will manifest if camera edit is locked
  - BU_CAM itself can be locked
  - or camera is locked

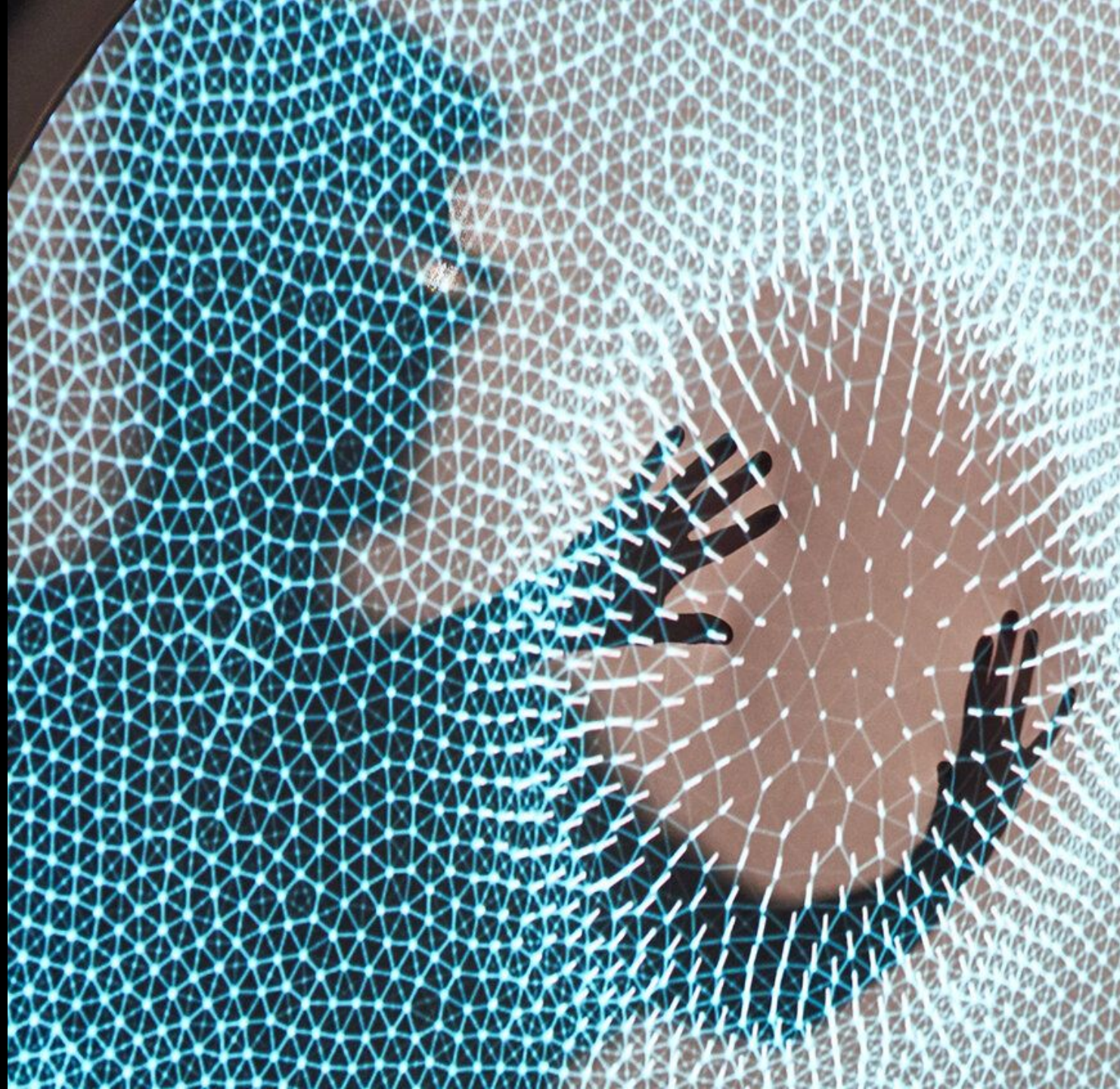
  When editing
  - **Wheel → Dolly in perspective, Size in orthogonal mode**
  - **Mouse → Rotate**
  - **Middle Click Drag → Move**
  - Key **o** → **Flip (o)rthogonal vs perspective**
  - Key **x|X y|Y x|Z** → **Align front | back**
  - **Ctrl Shift F4** → **Reset**
  - **F4** → **Focus** in **Flatland**
- **end with Left Click → accept edit**
- **end with Right Click → cancel edit:** go back to position at beginning of edit

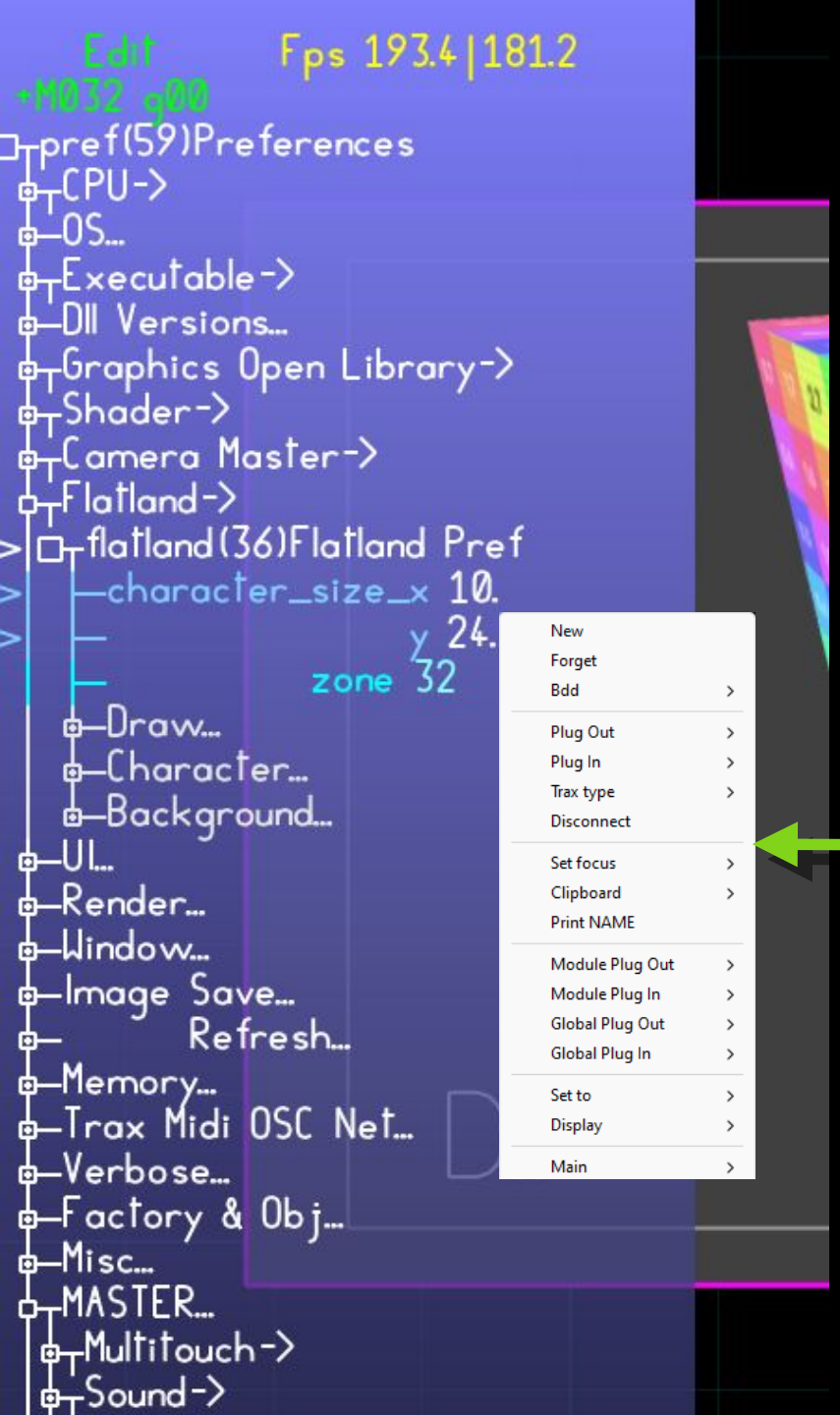
Camera Params

- To be added

AAASeed
An introduction
Part 13:
Flatland and Param

- Flatland 101 reminder
- Param
- Navigate
- Focus
- Param Edit
  - **Keyboard**
  - **Mouse**

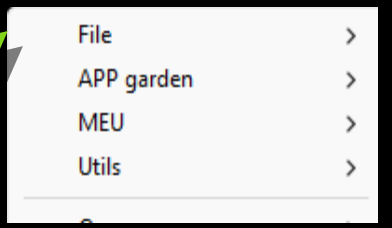




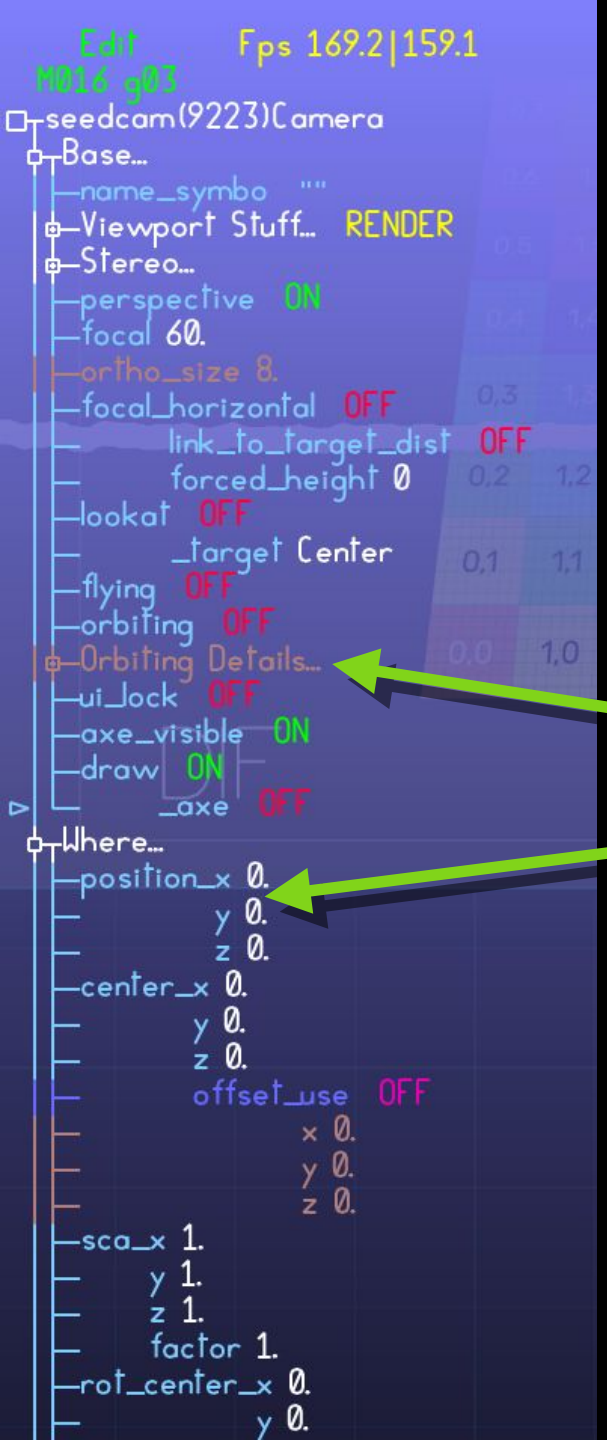
Flatland 101 reminder

- **Original AAASeed Ui** from previous century
  - **Name from « Snow Crash » book by Neil Stephenson**
  - where the **C++ can be seen and used**
  - made of **c_obj_ui and param** (for parameter)
  - Tree Made of params
    - developer will say render graph

- **Tab → switch flatland On/Off**
- **Right Mouse Button → Menu**
  - **in Flatland → Param menu**
  - **out Flatland → Main menu**
    - **GaBuZoMeu menu**
      - **Beginning of Main menu**



- **Flatland have precedence for events and keyboard**
- **Needs to be off to use keys with GaBuZoMeu**



Param

Short for **parameter**

Param have Type:

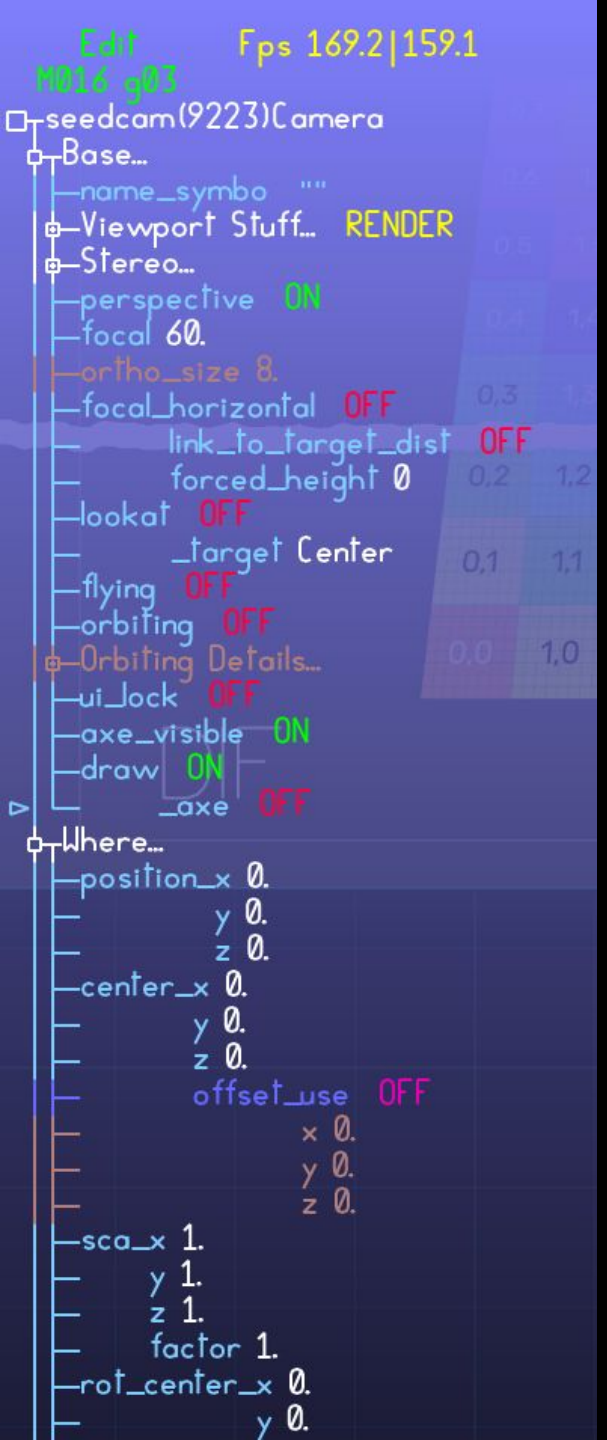
e.g. bool, integer, float, text, filename...

Param draw:

- **Box → something under**
  Big Box → Object
- **Param name**
  for C++ obj name is `class_name(id)human_name`
  Pinkish / Red param → Unused in this configuration
  no characters at beginning when same then previous line
- **Param value**
  for bool OFF ON
- **Yellow → Comment / Sum Up**

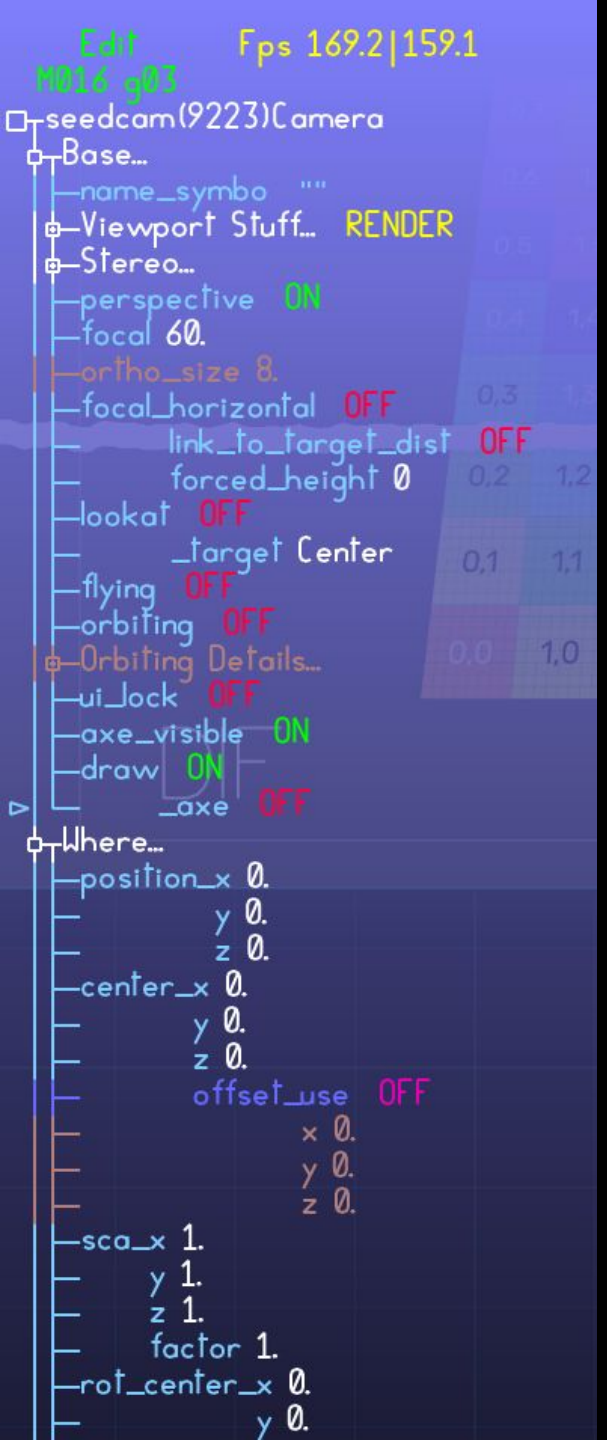
Param more info:

- **Big triangle pointing left just before name**
  parameter is generated by C obj it can't be edited
- **Small triangle pointing right at beginning**
  reference is defined



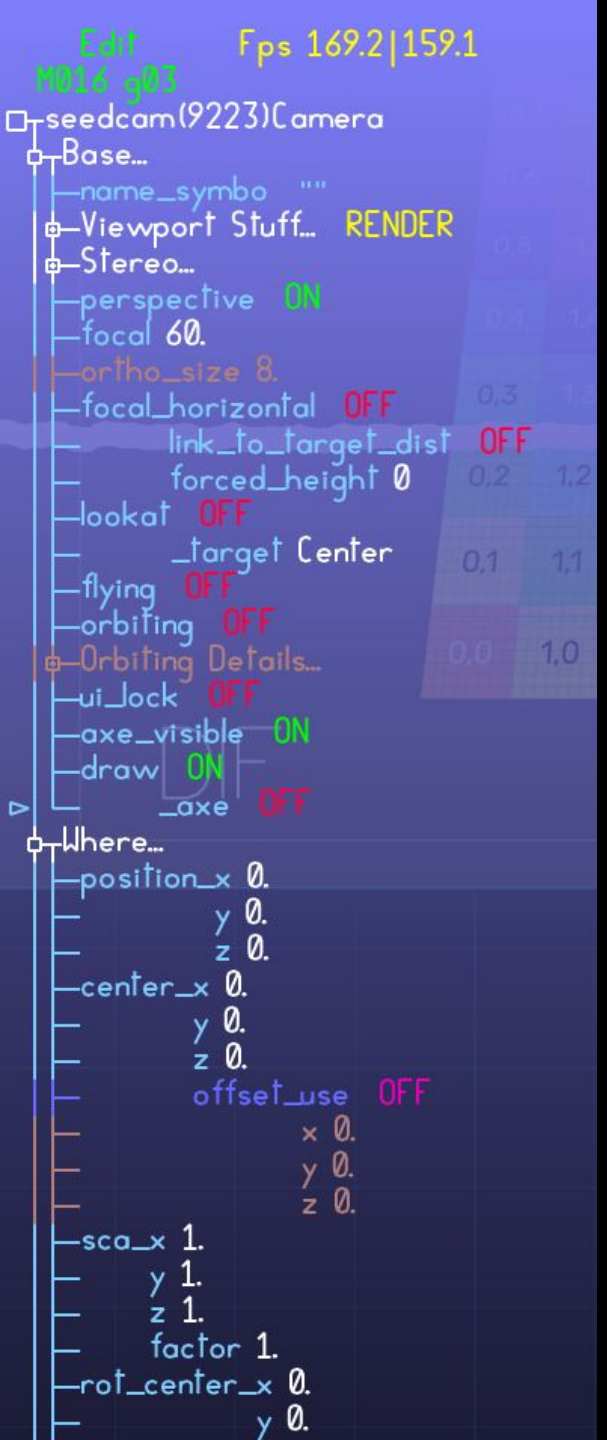
Navigate Params

- mouse wheel
  - → Scroll
- Click
  - Left
    - → Set current param
    - → Open / Close if possible
  - Right
    - → Menu
      depends on position
- Arrow key Up/Down
  - → Change current param Up/Down
- Space
  - → Open/Close if possible



Flatland Focus

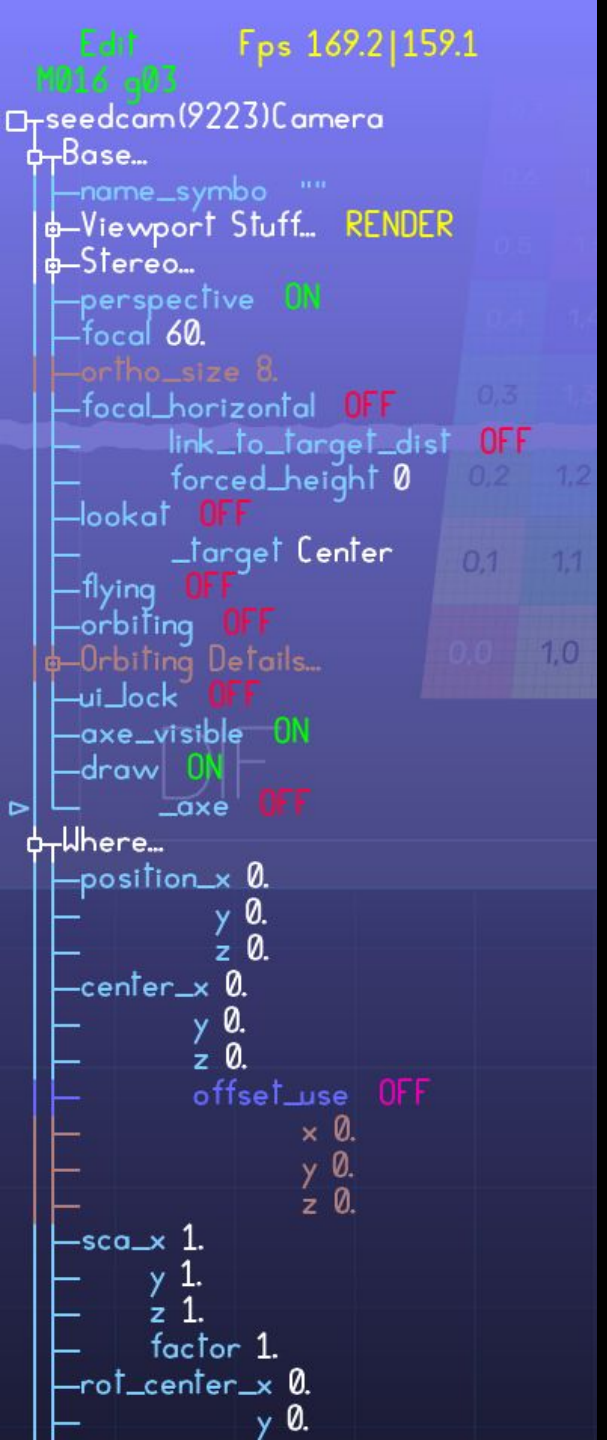
- focus means the object shown in Flatland
  the root of the tree
- Keys set focus on
  - F4 → current camera
  - F10 → Preferences
  - Double F10 → Start preferences
  - Triple F10 or 0 → Application
  - 2 → current c_module
  - 3 → current c_layers
  - 4 → current c_layer
  - Triple n → (n)etwork preferences
- Arrow key Left / Right
  → Navigate in Focus history



Param Edit: Keyboard

Similar to BU change value

- + - * / → Change
- Enter → Inverse
- . → Floor integer
- Home → Default
- End → Inactive
- PageUp → Maximum
- PageDown → Minimum



Param Edit: Mouse

- Boolean
  - Drag left and Right
  - param_trig
    - Just click it
- Integer, Float
  - Hold click while turning around click point
    - clockwise to increase
    - counter clockwise to decrease
    - do as much turn you want
  - Change sensibility
    - Ctrl → Slower
    - Ctrl Tab → Even Slower
    - Shift Ctrl → Faster
    - Shift Ctrl Tab → Even Faster
- Double Click
  - → trigger Dialog or Action if available for param

- Developer note
  - Alt Middle Click → flip debug view for param

AAASeed
An introduction
Part 14:
Texture

- Image and texture
- CPU and GPU Memory
- Texture channels
- Channel type
- Banks of Binds:

  Texture Slots
- BU_BANK
- BU_BANK Edit
- BU_MONITOR StarMenu

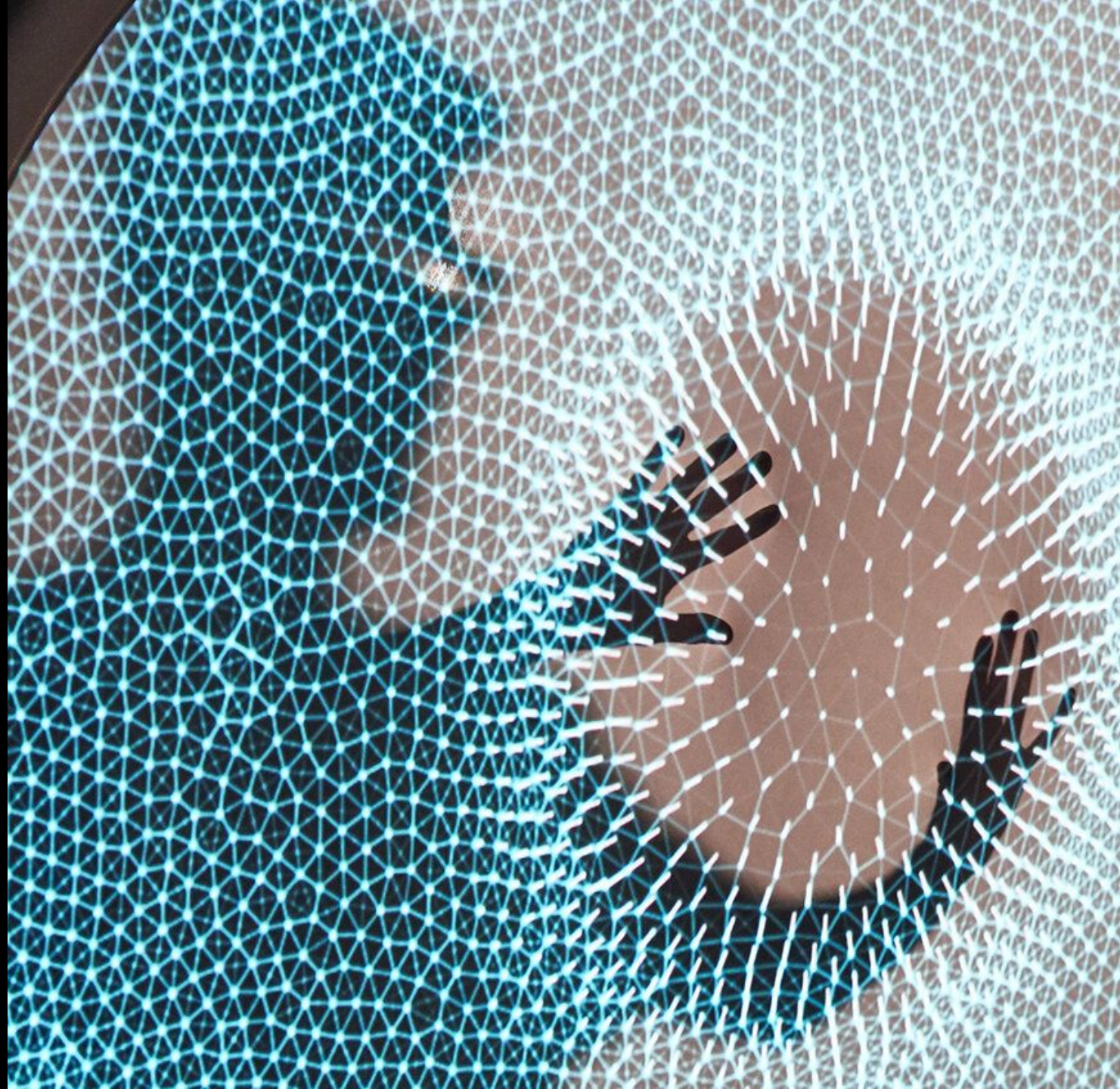


Image and **Texture**

- **Image**

  2d grid of pixel

  On the CPU side

  CPU mean **Central Processing Unit**

  The Intel or AMD processor used on your computer

  CPU side mean **CPU Memory**

  e.g, when a jpg file is read it is first moved to CPU memory
  then decoded by the CPU and stored there.

- **Texture**

  Same as an image but on the GPU side

  GPU mean **Graphics Processing Unit**

  The massively parallel Graphics processor on your computer
  Nvidia or AMD graphics card

  or a less powerful « integrated Graphic Card »

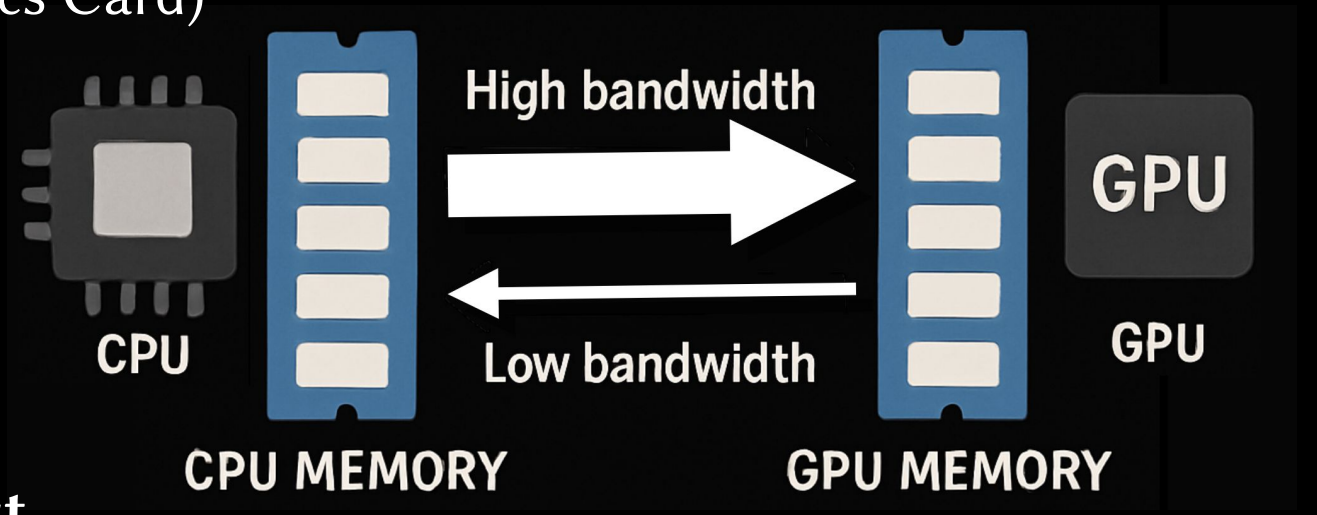
  e.g. the image decoded from from a jpg file stored on the CPU side is moved to the GPU side so it can be drawn by the GPU

- In fact we want you to understand that there is two different memory and that data have to be in the right memory to used by the ad hoc processor.

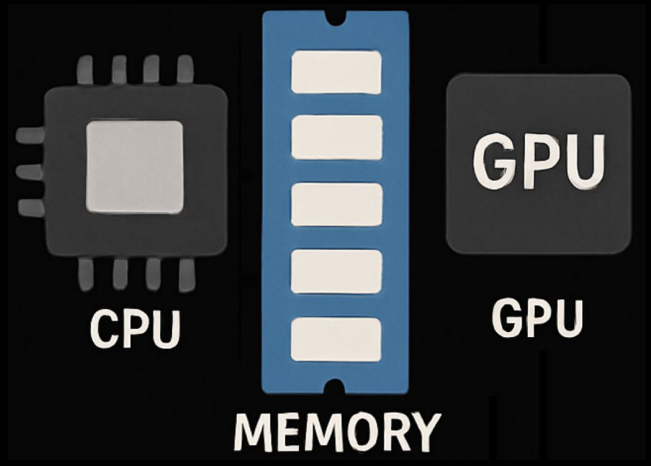
CPU and **GPU Memory**

- **Separate Memory** (Discrete Graphics Card)
  - **Memory Transfer to do**
    CPU to GPU transfer is fast
    GPU to CPU transfer is slower
    - **can cost a lot**
      developer note
      - it stall the pipeline

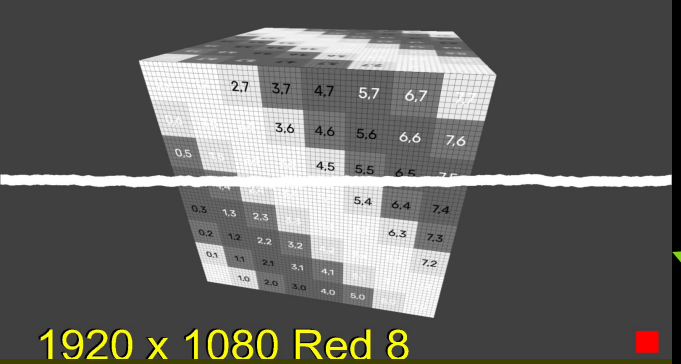
    GPU memory can be really fast

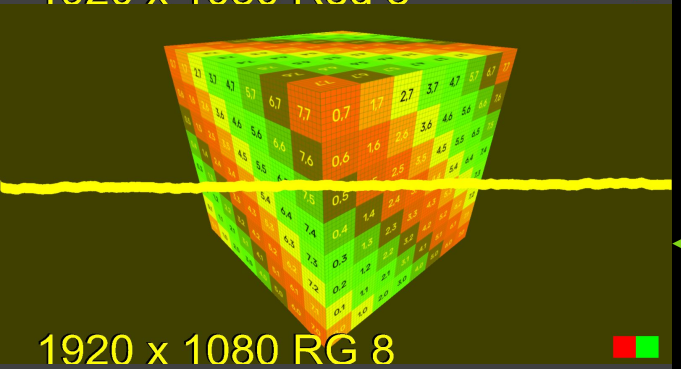


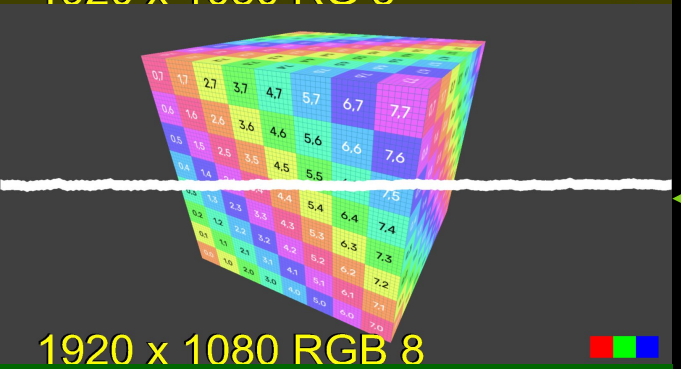
- **Unified Memory** (Integrated Graphics)
  - **No memory transfer**
    Memory is slower
    - than dedicated GPU memory

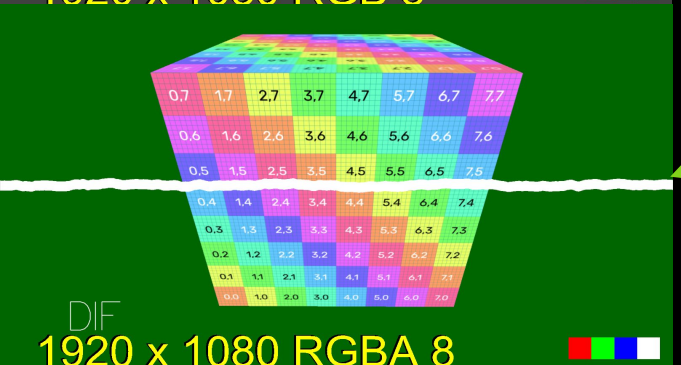


Texture channels









See BU_MONITOR part

- **1 or R for Red**
  showed as **greyscale**
- **2 or RG for Red + Green**
  showed as **yellow**
  no Blue
- **3 or RGB for Red + Green + Blue**
  full color
- **4 or RGBA for RGB + Alpha**
  like RGB but with transparency/Opacity
  0 mean transparent, 1 Opaque

Channel type

- AAASeed support texture where **all channel (component) have the same type**
  - **Integer 8 bits (8) → 256 values, from 0. to 1., about 2 decimal digits precision**
    Compact, used if no more requirements.
  - **Integer 16 bits (16) → 65 536 values, from 0. to 1.,about 5 decimal digits precision**
    Use when more precision is needed (e.g. HDR).
  - **Float 16 bits (16fp)→ from –65 536. to 65 536., about 3 decimal digits precision**
    Also called half for half precision floating point
    Fix floating point format,
    Use when 0. to 1. is not enough.
  - **Float 32 bits (32fp)→ wide range, about 7 decimal digits precision**
    Fix floating point format,
    Use when its precision or range is needed.
- **Smaller is faster**

- AAASeed support others channel type
  e.g. Depth/Z buffer 24bits, compressed format, YUV ...
  but you can ignore this for the moment

Banks of Binds : 2048 Banks of 32 Binds
⟶ 65 536 Texture Slots

- Texture are referenced at low level from 0 to 65 535
  - we say flat bind
  - Texture are referenced most of the time with
    - a bank index [0, 2047] and a bind index [0,31]
    - flat bind = bank * 32 + bind
  - Some Texture are referenced by a texture name
    - more in Part Texture More

- Each slot can store a file name
  - when a bind/slot is accessed if there is no texture and a file name is defined AAASeed try to load in the slot.
  - This is how you already have certain texture when you start AAASeed
  - Flatland then key 0 to focus on app/Bind_list/Image/bind
    - if you want to see the list of filename
  - Save as global in User Pref (Double Esc or Ctrl S) with a .image_bind extension

BU_BANK

BANK

No texture

Slow blinking redish

Blue diagonal

Each bind a Monitor:

Click Double or Space

Open monitor

StarMenu Extended

Bank selector

bank contains 32 binds

Bind in bank

[0,31]

Name

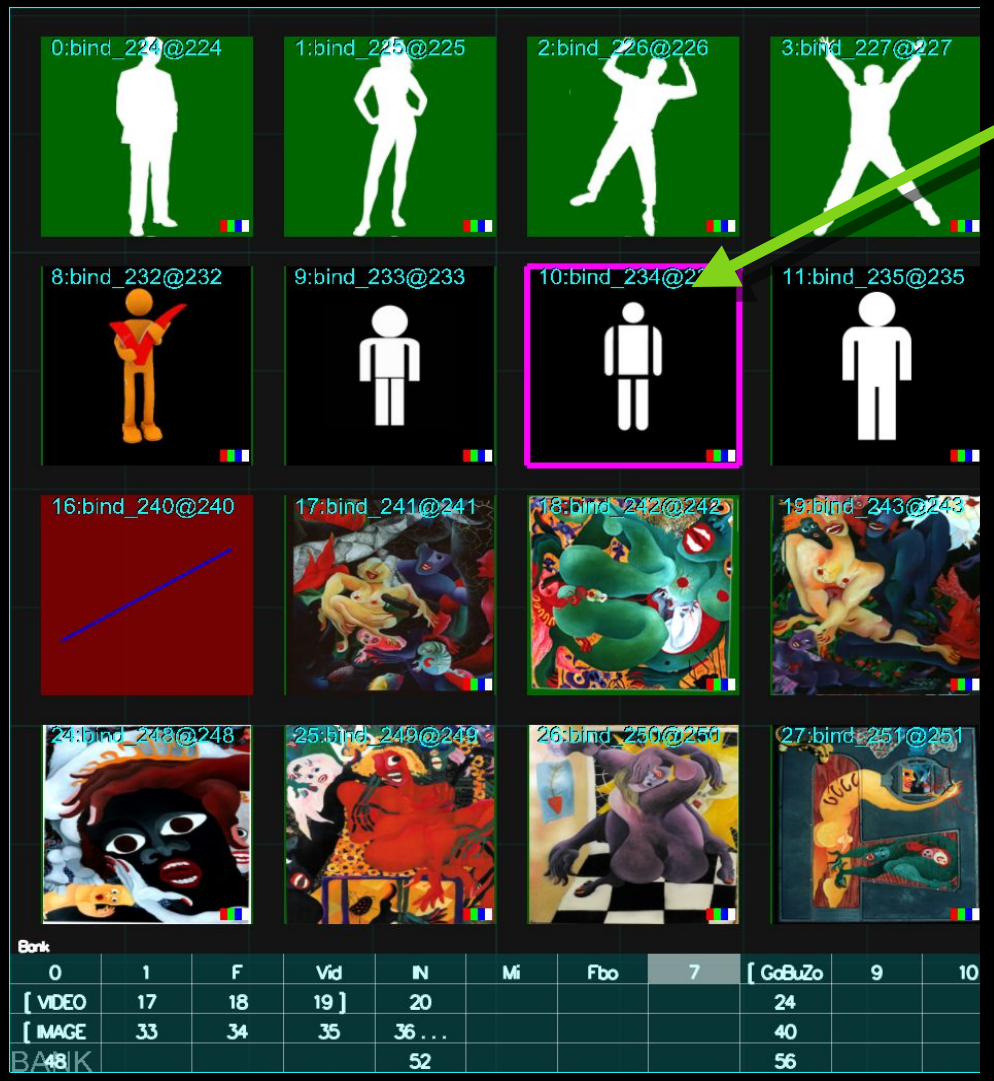
Flat bind

[0,65535]

bank offset

0 to 1984

BU_BANK Edit



- When a BU_BANK monitor is the current BU
  and flatland is off (reminder)

Ctrl Arrow

Swap texture and filename with the bind in the arrow direction

Stay in the current bank

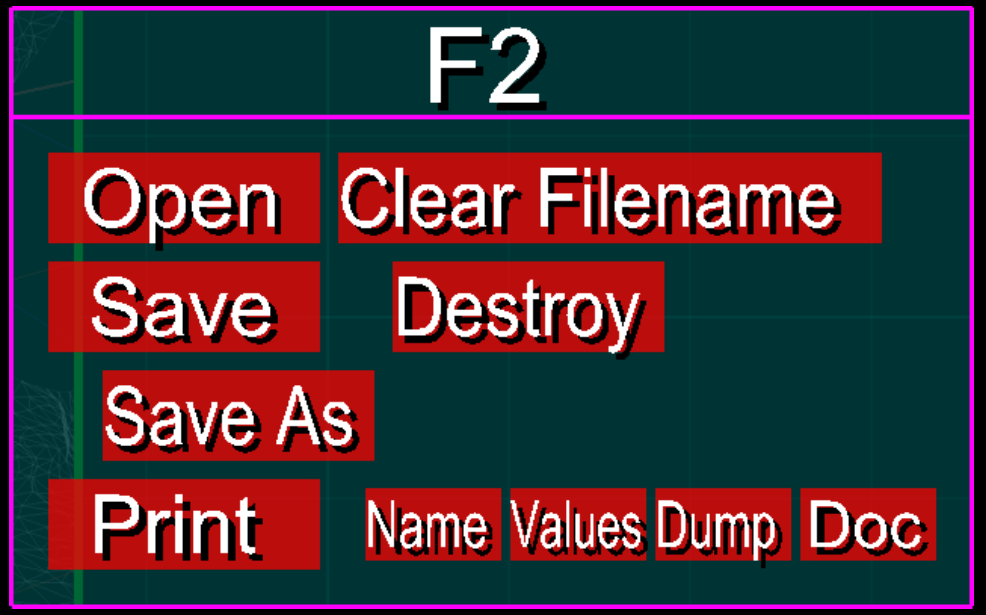
Ctrl C/Ctrl V

Copy/Paste texture and filename

Can be done across bank

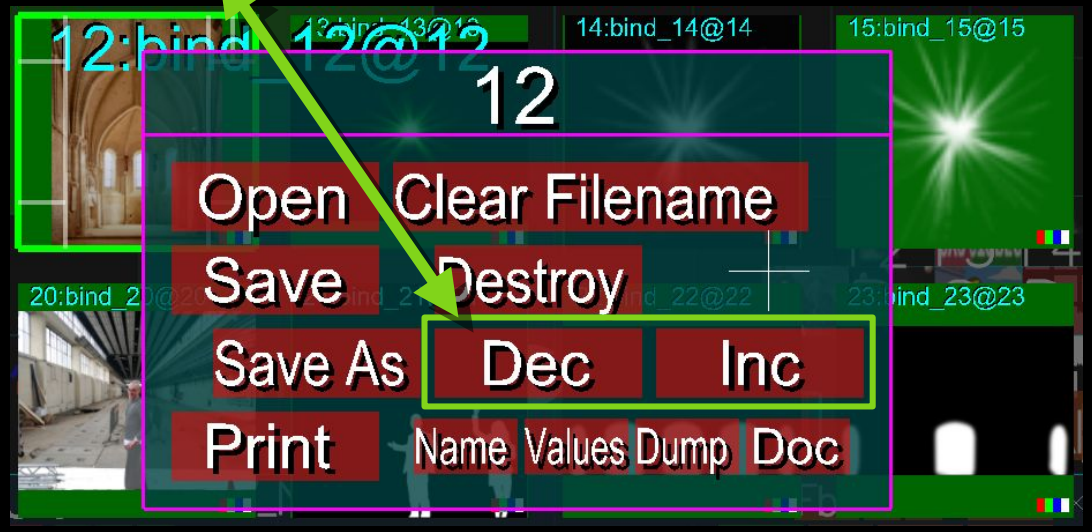
BU_MONITOR StarMenu Reminder

- **Use Quick drag-out** like any BU where it doesn't appear directly
- **Open**
  - **Load image(s) via a file dialog**
    - **at the current bind**
      - later on this (Part 14: Texture)
    - **can choose several files**
      - loaded in successive binds
  - **Set the filename for this bind**
- **Save**
  - **Save the Image to** Media/AAASnapshots
  - How it is saved is in Flatland Prefs/Image Save
  - **Note that Save do not use the bind filename set by Open**
- **Save As**
  - **Save with a file dialog to choose location**
- **Print**
  - **Print the image**
  - How it is printed is in Flatland Prefs/MASTER/Print
- **Clear Filename**
  - **Clear the the filename for this bind**
- **Destroy**
  - **Destroy the texture for this bind**
  - **Clear the filename too**: no more pixels or filename left



BU_MONITOR BU_BANK StarMenu

Same StarMenu with more commands



- **Dec**

  (Dec)rement the texture index

  in fact **swap with the previous one**

  Same as Ctrl Left

- **Inc**

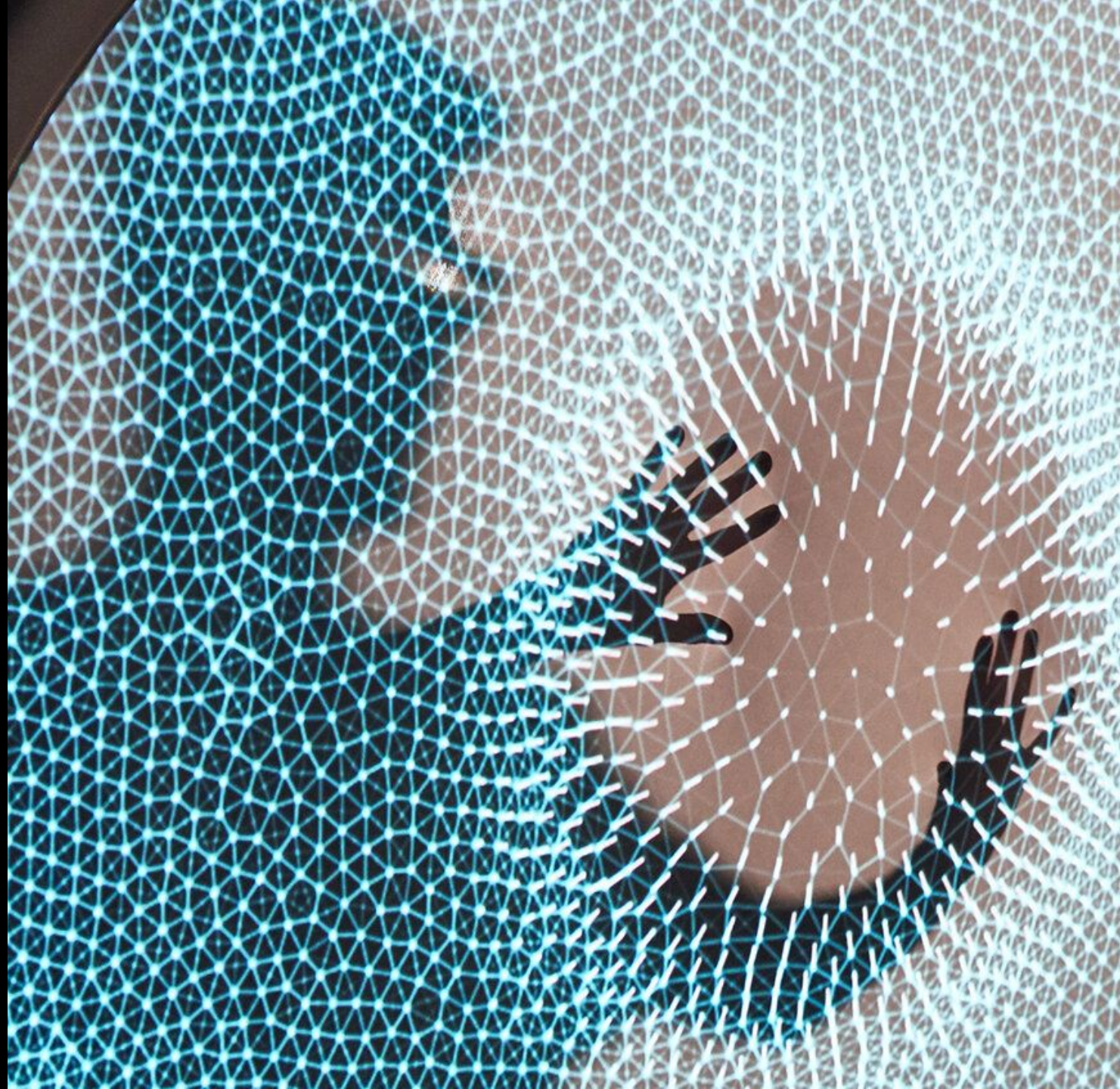
  (Inc)rement the texture index

  in fact **swap with the next one**

  Same as Ctrl Right

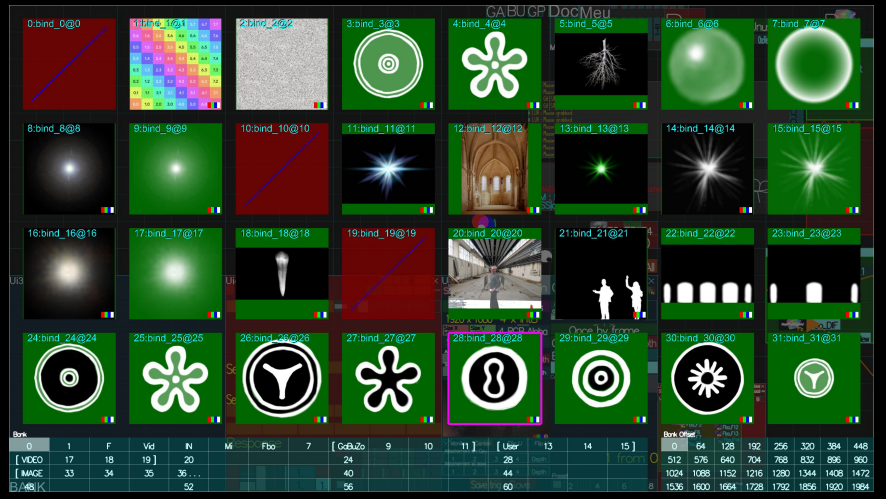
AAASeed
An introduction
Part 15:
Texture More

- An apology
- BU_BANK and BU_TEXTURE
- Texture Name
  - **More**
- BU_TEXTURE
  - **Bank button**
  - **Bind Slider**
  - **Shortcut BU**



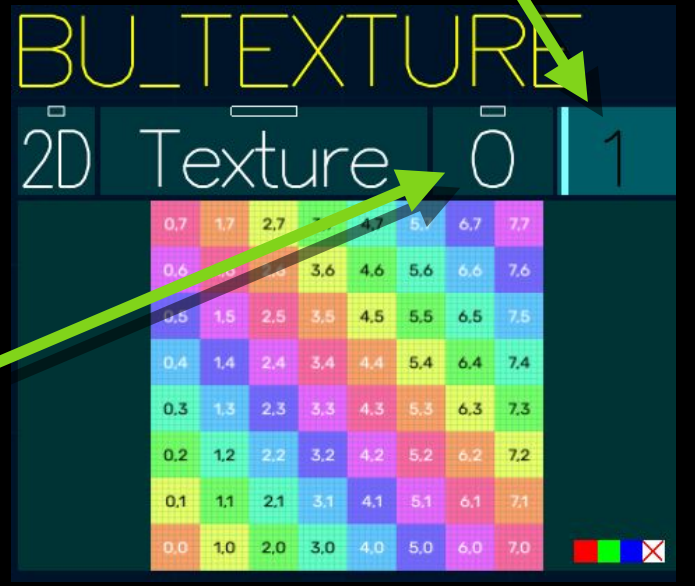
Disclaimer on current texture architecture

- It is a problem
  - Mâa apologize deeply
- We now it, it is tricky
  - Bank fixed size
  - No User Bank
  - ...
- We could not change it before the end of the ArtCast4d project
  - There will be MEU Bank to define and edit them
  - Future Banks will have names (not only number) and each their own bind size
- We have to live with it for a while (2025)
  - This is stable and solid.
  - The new texture architecture will probably keep the current structure at the bottom and build on top of it.



BU_BANK and BU_TEXTURE

bind



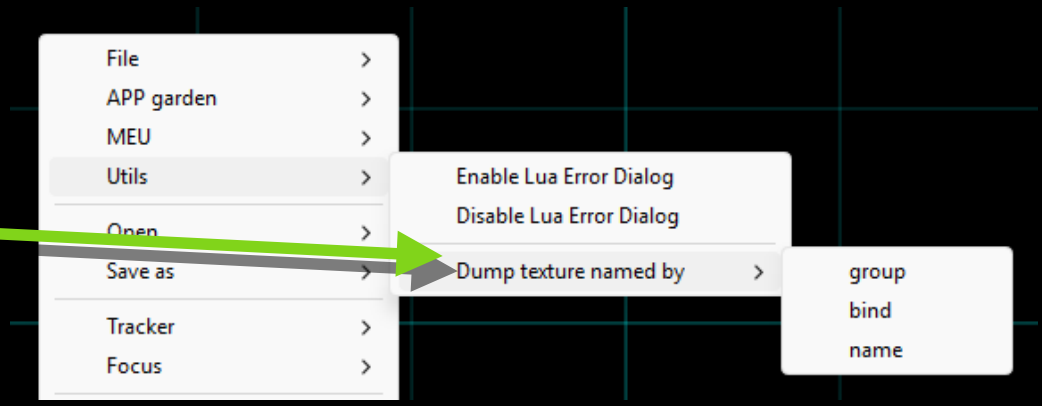
bank

Texture Name

- **Bank and bind was too abstract**
  Texture Name concept was added
- **Each App have a set of names**
  corresponding each to a flat bind index
  a name → a flat bind → names
  e.g names A to P used in general for 16 Videos slots
  name are made of alphanumeric character and dot (.)
- **Ui in particular BU_MONITOR use and display name when they exist.**
- **Names are defined case sensitive (for a nice display) but search is case insensitive.**
- **A name is eventually associated with**
  a short name
  a synonym.
  any of these can be used.
- **Texture name are regrouped in groups.**
- **One texture can be referenced by several names.**

Texture Name more

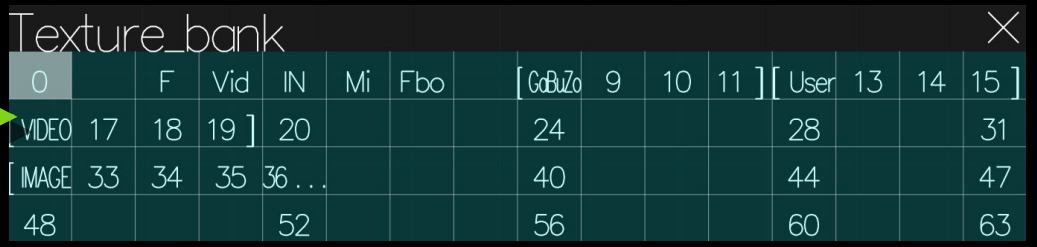
- If you want to see all the texture names used in an App
  use the Utils SubMenu
  All names will be printed in the terminal window.
- Main groups
  - F1 to F24 24 binds from bank 2 (or F)
    used by MEU_Video in general
  - A to P 16 binds from bank 3 (or Vid)
    used by MEU_Fbo in general
  - In1 to In32 32 binds of bank 4 (or IN)
    used as Input in general
  - Mi1 to Mi16 16 binds from bank 5 (or Mi)
    used by MEU_Mire in general (Pattern in french)
  - M1 to M32 32 binds of bank 11
    used for Monitors
  - A pass group use for multipass rendering
    this will be treated in separate document
    e.g. Albedo, Normal, Specular, Emissive, Light, Fxaa ...
- A lot of these names appear in the shortcut menu in the next slide
- A texture name DIF is defined
  - This bind is often use by default to draw in (see FBO part)



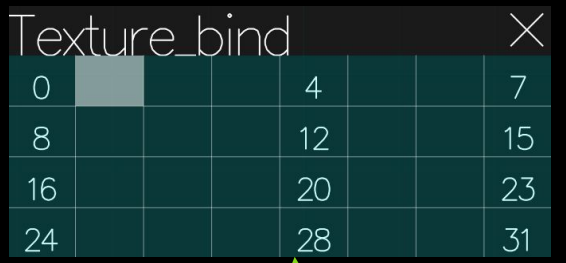
- **BU_TEXTURE choose a texture**

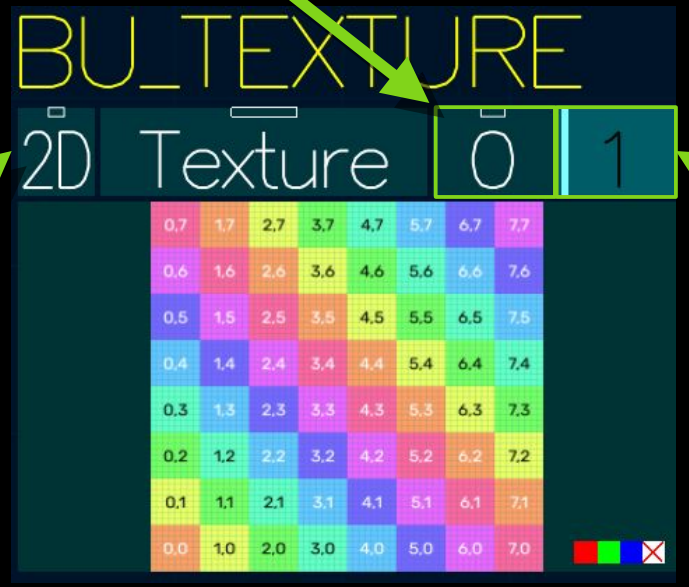
Bank button to choose the bank

Click open a selector



Double Click in these selectors
triggers a dialog to load texture in current bind





Dimension
(Optional)
up to the MEU

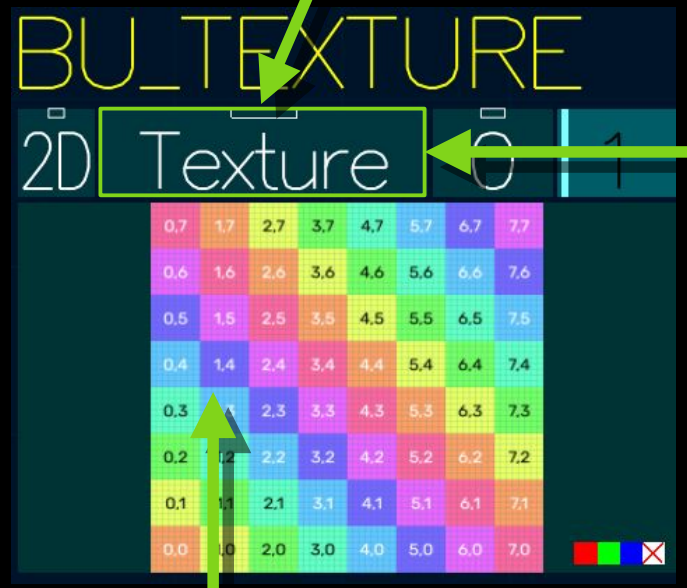
Bind slider to choose the bind

click open a selector and starMenu

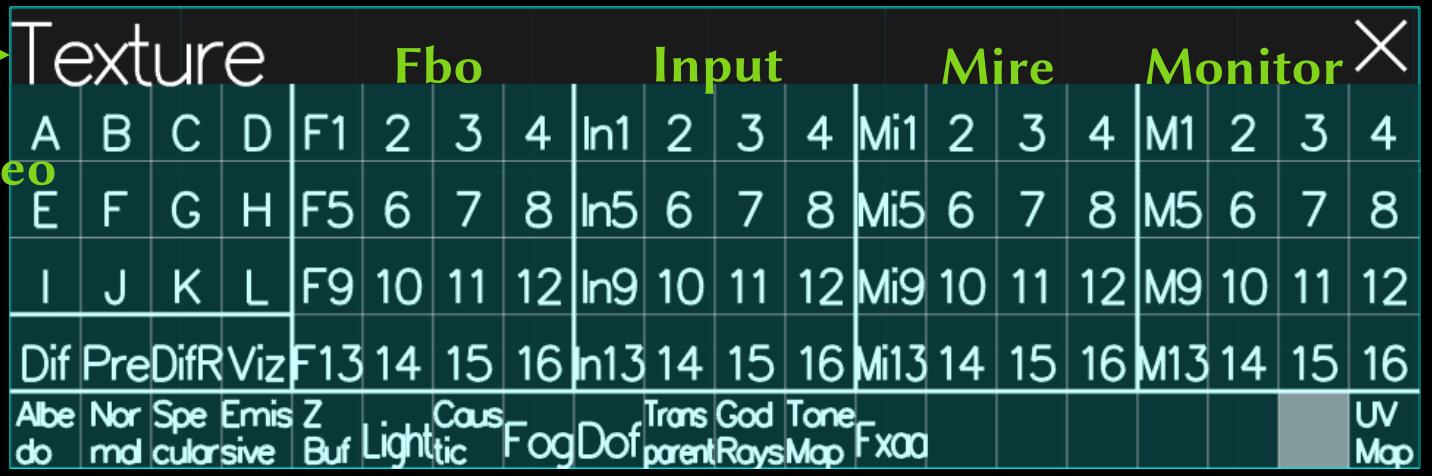
- **BU_TEXTURE Shortcut BU**
  - **A shortcut BU simplify the manipulation**

    Click open a **window** with the **most used texture names**

    StarMenu provide also a fast way to **navigate and select one texture**



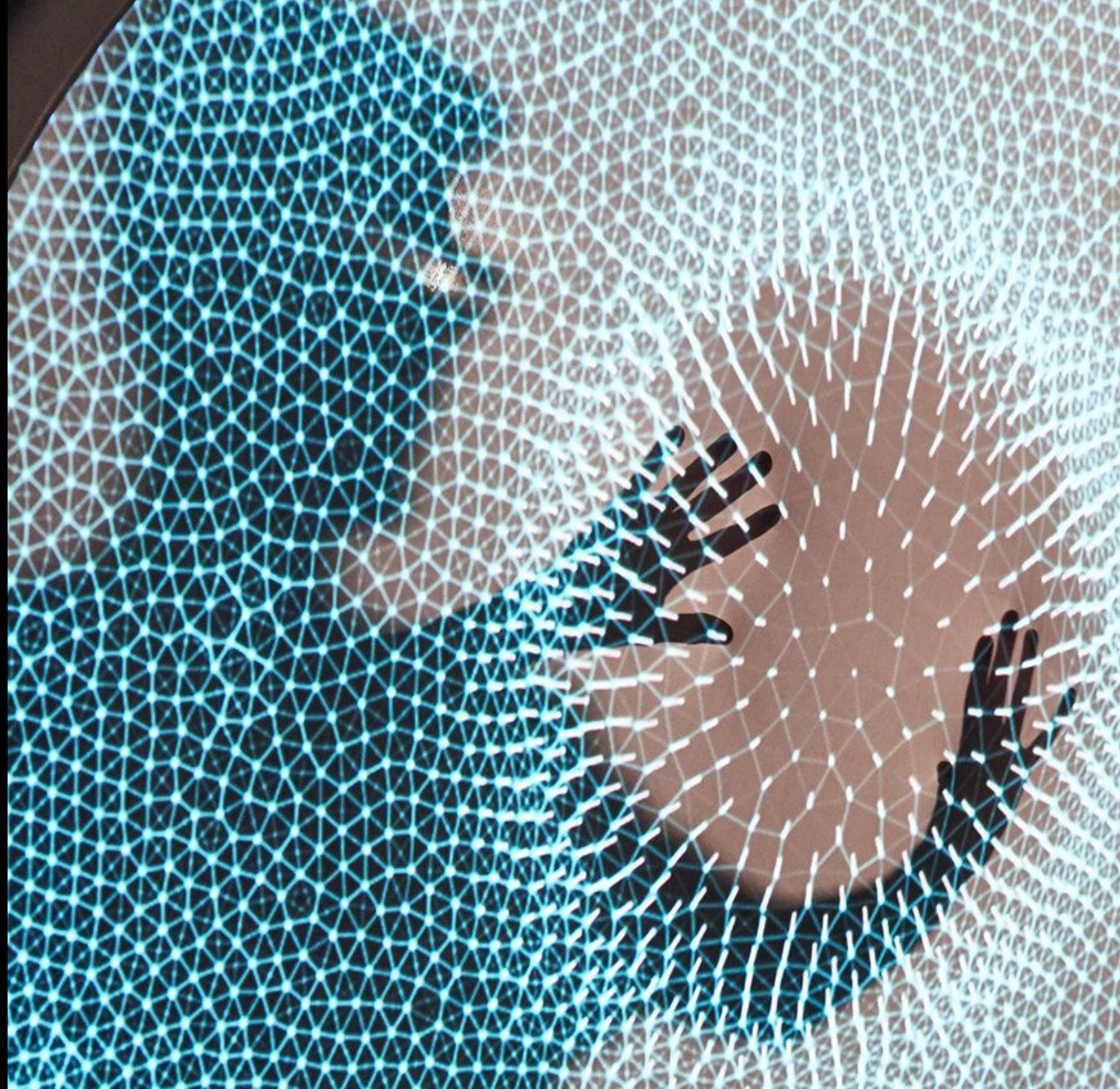
Video



- Monitor can be used here too (Click zones, StarMenu, Keyboard)

AAASeed
An introduction
Part 16:
Fbo

- Frame Buffer
  - Canvas
- Fbo/Frame buffer object
  - **Attachments**
- Fbo render chain
  - **No Fbo**
  - **MultiPass example**
- MEU Fbo name
  - **DIF name**
- MEU Fbo Ui
  - **Main tab**
  - **Copy tab**



Frame Buffer

- Concept from **Computer Graphics and Video**
- **Frame = Image**

  A frame is a single complete image in a sequence — like a frame in a video.
- **A framebuffer is a memory buffer** that stores the color values of each pixel before they are displayed on the screen.

- Think of it as a **digital canvas**

  The GPU draws into this canvas. It's where rendering results are stored — either for display or further processing.

  where the pixel are written and stored to be displayed or reused later
- **Used in Effects and Multi-Pass Rendering**, Framebuffers aren't just for final output:

  Effects like shadows, reflections, bloom, and motion blur often render to intermediate framebuffers.

  These act as scratchpads — temporary storage used to build up complex visual effects over multiple rendering passes.

Fbo / Frame buffer object

- **In AAASeed Frame Buffer or Fbo are specific MEU**
- **A Fbo regroups textures** (images) of the **same size** called **attachments.**

  - Color attachments

  we use 1 most of the time, but AAASeed deal with up to 8 if needed.

  -Depth attachment (used to do z-Bufferring)
- **Fbo are needed to draw into textures.**

- **AAASeed use a MEU_Fbo**

  Special MU display

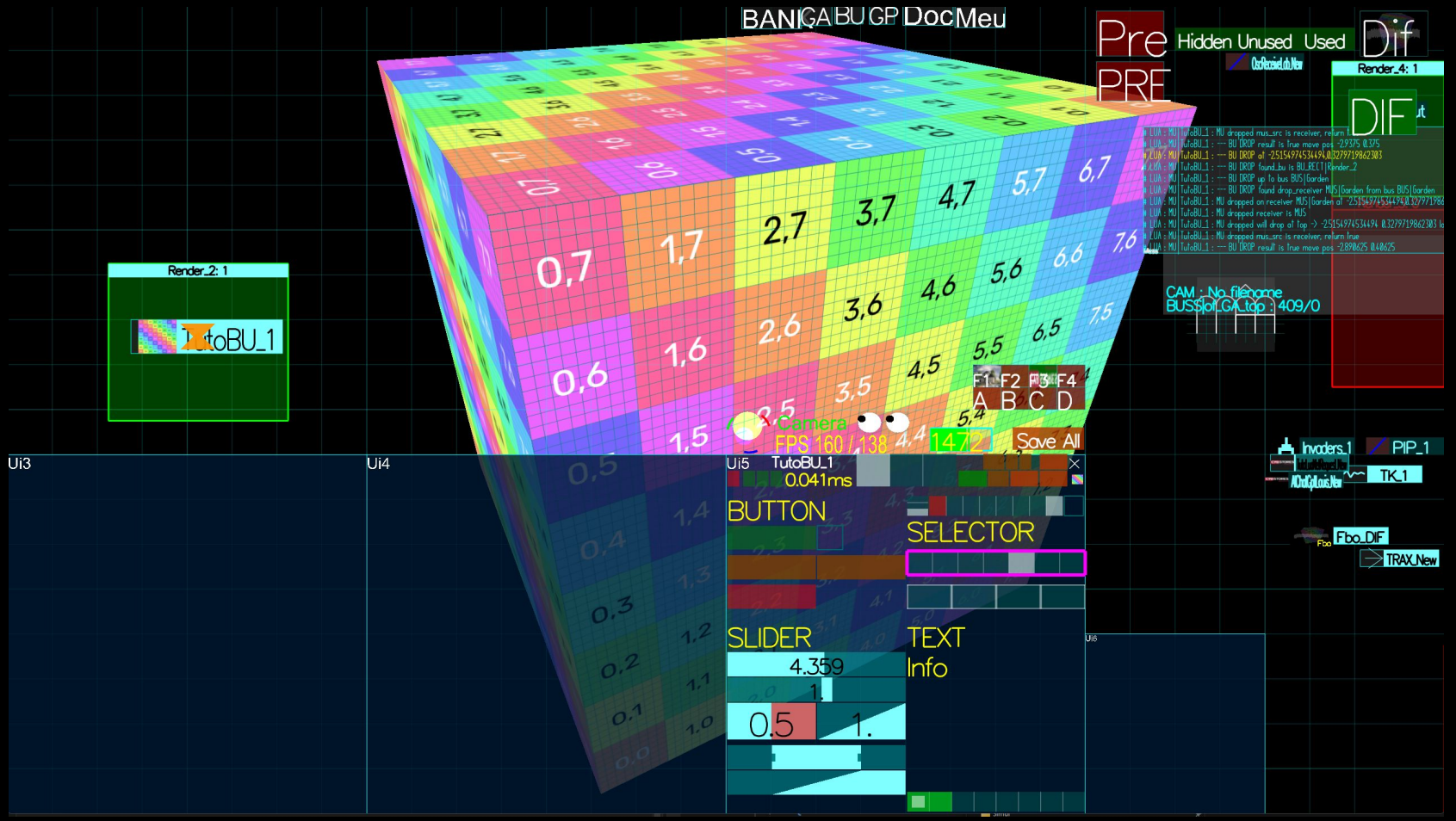
  Icon changing size

  Fbo yellow letters animated

Meu_Fbo and render chain: No Fbo

At the beginning of the render chain there is no Fbo defined yet

So AAASeed draw directly to the back of the window, under the Ui.



Meu_Fbo and render chain: Multi pass example

As soon a MEU_Fbo is executed in the render chain

All the following Meu in the render chain use it

until a new Meu_Fbo is executed and changing the current Fbo

Here (bottom to top)

1- **Meu Fbo_F1** is executed

it defines a 1024 x1024 **texture** 1 channel 8 bits

it erases itself with grey and **become the current Fbo**

2- **Meu Invaders** is drawn **in the current Fbo: F1**

3- **Meu TK_1** is drawn **in the current Fbo: F1**

4- **Meu Fbo_DIF** is executed

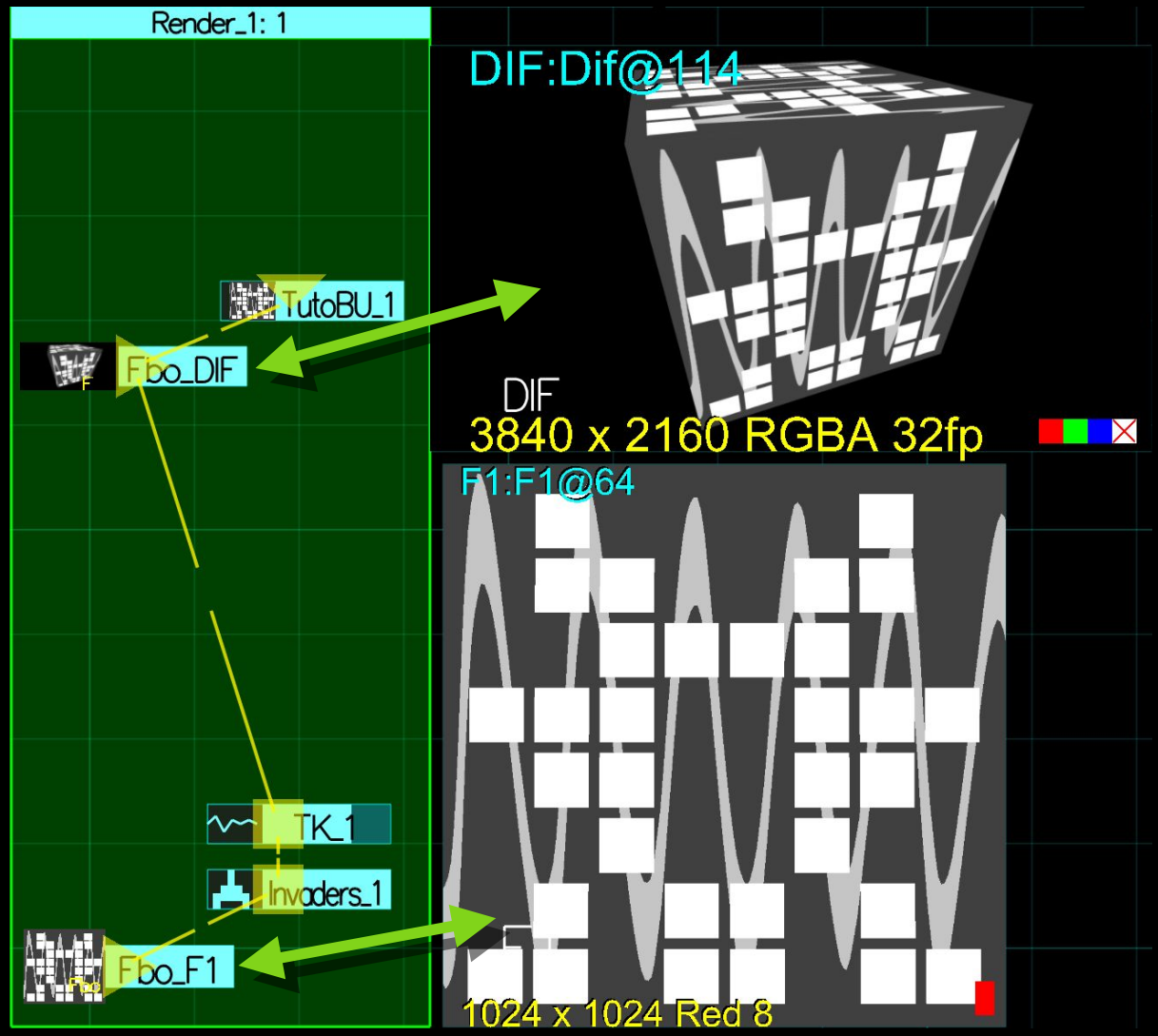
it defines a 4K **texture** with 4 channels 32fp

it erases itself in black and **become the current Fbo**

5- **Meu TutoBU_1** is drawn in the **current Fbo: DIF**

In fact **TutoBU_1 use texture F1** (attached to Meu Fbo_F1) to **map** on **the faces of the cube**.

This is an example where a **Meu_Fbo is used to draw to a texture (F1) and then this texture is used later by another pass.**



MEU Fbo name

- **There is two ways to setup a Fbo**

  Manually using Flatland

    Not recommended to new users

    - Meu Fbo would eventually get an extended Ui for this

  At creation or renaming

    If the **instance name of the MEU correspond to a texture name**

    this **texture is set up as the first color attachment (1)** for the fbo

- **DIF** texture name and **Fbo_DIF**

  DIF stands for **DIFfusion, this is often the Fbo we render at the end and display to the public.** It comes from TV control room lingo.

  when AAASeed is used live we often have **plenty of graphics processed running**, Some are not even visible to the public, but drawn into Fbos and visualized using BU_MONITOR or output control monitors. **This way we can prepare, tweak and adjust**. **At some point we will move a process to be displayed in the DIF.**

  Sometimes before displaying the DIF, we add elements (logo, ticker, signature...) to it, or process it with some dedicated MEU (name often Ndc...) to adjust color, reduce the aliasing, add a reference grid...

  It is also common practice to have a high definition DIF (4K or 8K) to render, but output at a lower resolution to have a smoother image. This remark apply to any Fbo used for an intermediate pass.

MEU Fbo Ui Main Tab

- **Active → if it is Off: the Fbo is not used**
- **Focus → Open flatland focused on the c_fbo object**
- **Size in pixels**

  of attachments (all the same)
- **Color format**

  of color attachments

  in the MEU Ui they are **all the same**

  use flatland if you need more control

  4 x Int8
  4 RGB Alpha
  Integer 8 bit
- **Attachments**

  active Color (4) and Depth attachment

  select which one you see in the monitor below

  Local monitor to see the selected attachment

  Double Click to open external monitor

  Control monitor and texture display

  Allow Monitor for attachment 1

  Center monitor, flip texture display

  Select which Gpu to Cpu transfer happen

  when the render chain is done with this fbo, an automatic transfer to the Cpu can be trigger

  Select which attachment are saved (see below)

  if no selection attachment 1 iss always saved
- **Save, in Media AAASnapshots**

  Depth attachment are not save for now (2025 July)

  Save Trig → save One frame

  Save → save Each frame

MEU Fbo Ui Copy Tab

- **Cameras**

  sometimes we want all the next MEUs in the render chain to use the same camera. So we can use a camera defined in this MEU.

- **Clear**

  control globally if we erase and how we erase

  can be done every time or only once by frame rendered (Meu can be used several time in a frame)

  Depth

  control erasing of the depth attachment

  Color

  control erasing of the color attachments

  Trail

  when we don't erase we can have a trail effect. We specify its **length** here.

  Long trail (> 2) require pixel type bigger than 8 bits

  Alpha

  the value we want to set when we erase

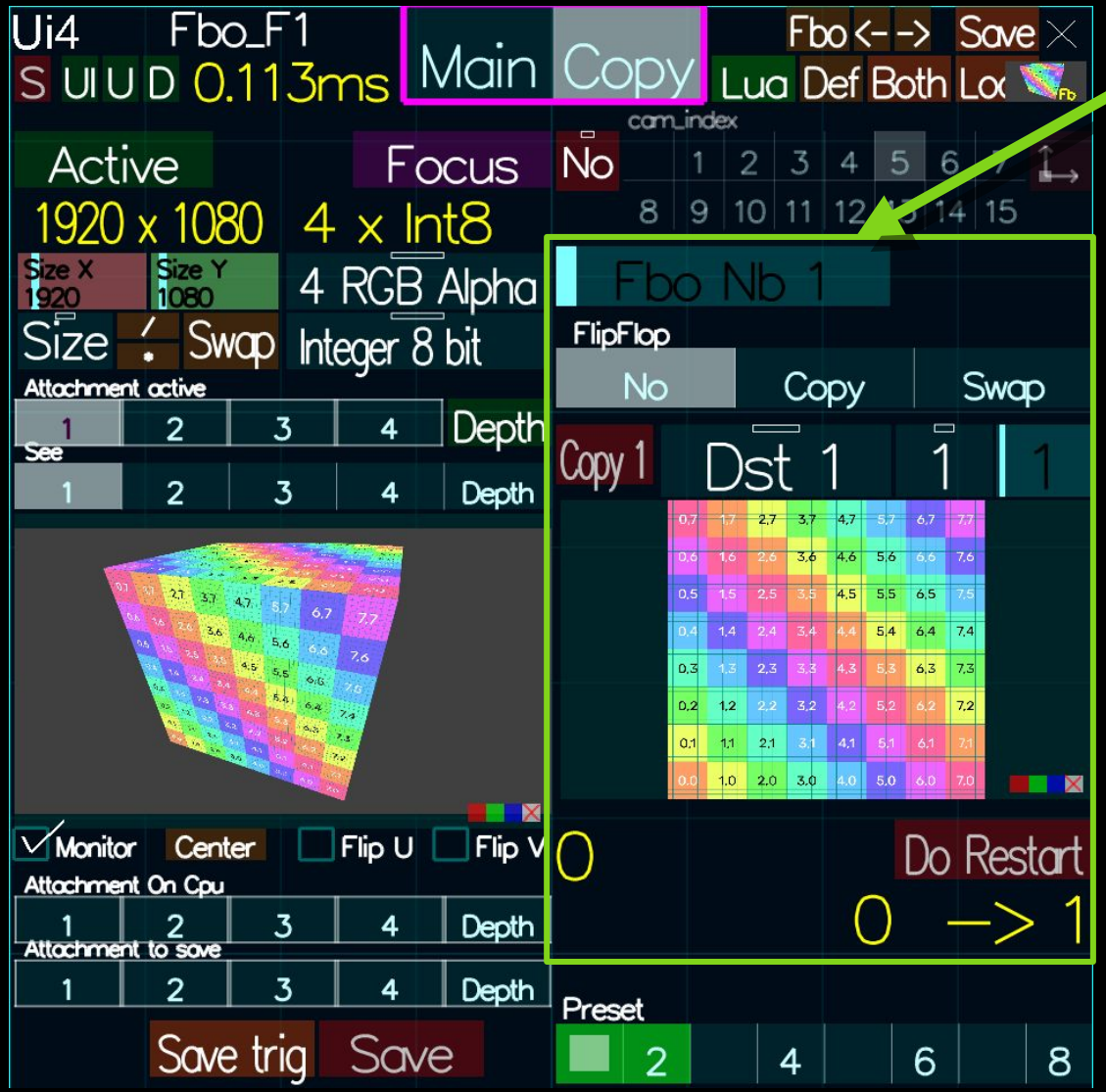
  use 0 for transparent background

  Erase Color

  a set of predefined colors and a Custom color

  Custom color components RGB + a grey factor

MEU Fbo Ui Copy Tab (developer only)



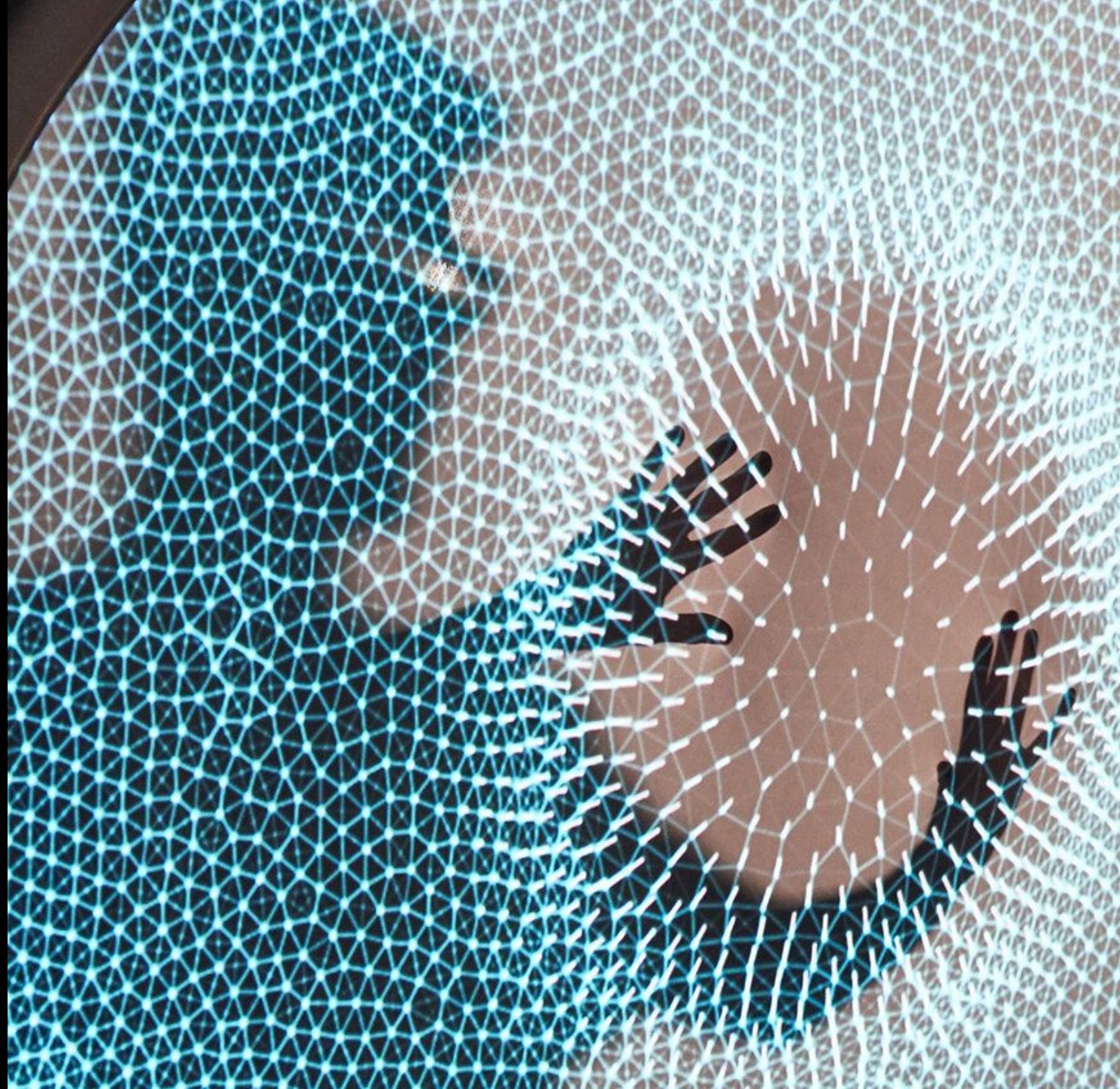
- **Do not touch any of these BUs if you don't know what you do**
- This need will be simplified later (2025 August)
- **it is used by other MEUs**

  to render in a succession of textures to keep few frame of history (e.g. do a difference for a camera input with MEU NdcMerge)

  deal with fbo « flipFlop » required by some other MEUs (e.g. ReactDif, JumpFlood, Branching)

AAASeed
An introduction
Part 17:
Meu Monitor

- Display Fbo attachment
- Copy Fbo attachment
- MEU Ui
- As a “texture plug“

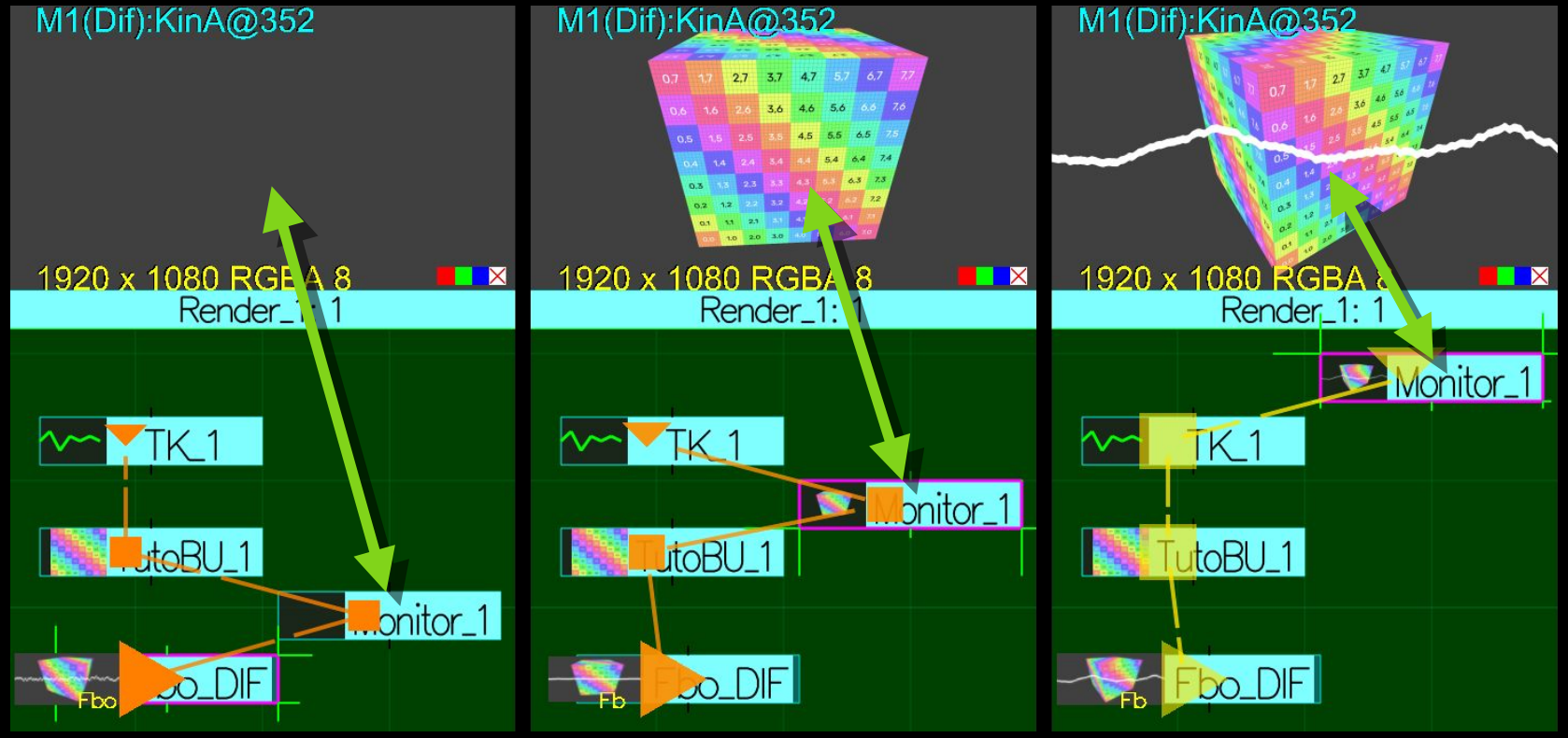


• MEU Monitor Display Fbo attachment

- Display state of current Fbo in the render chain

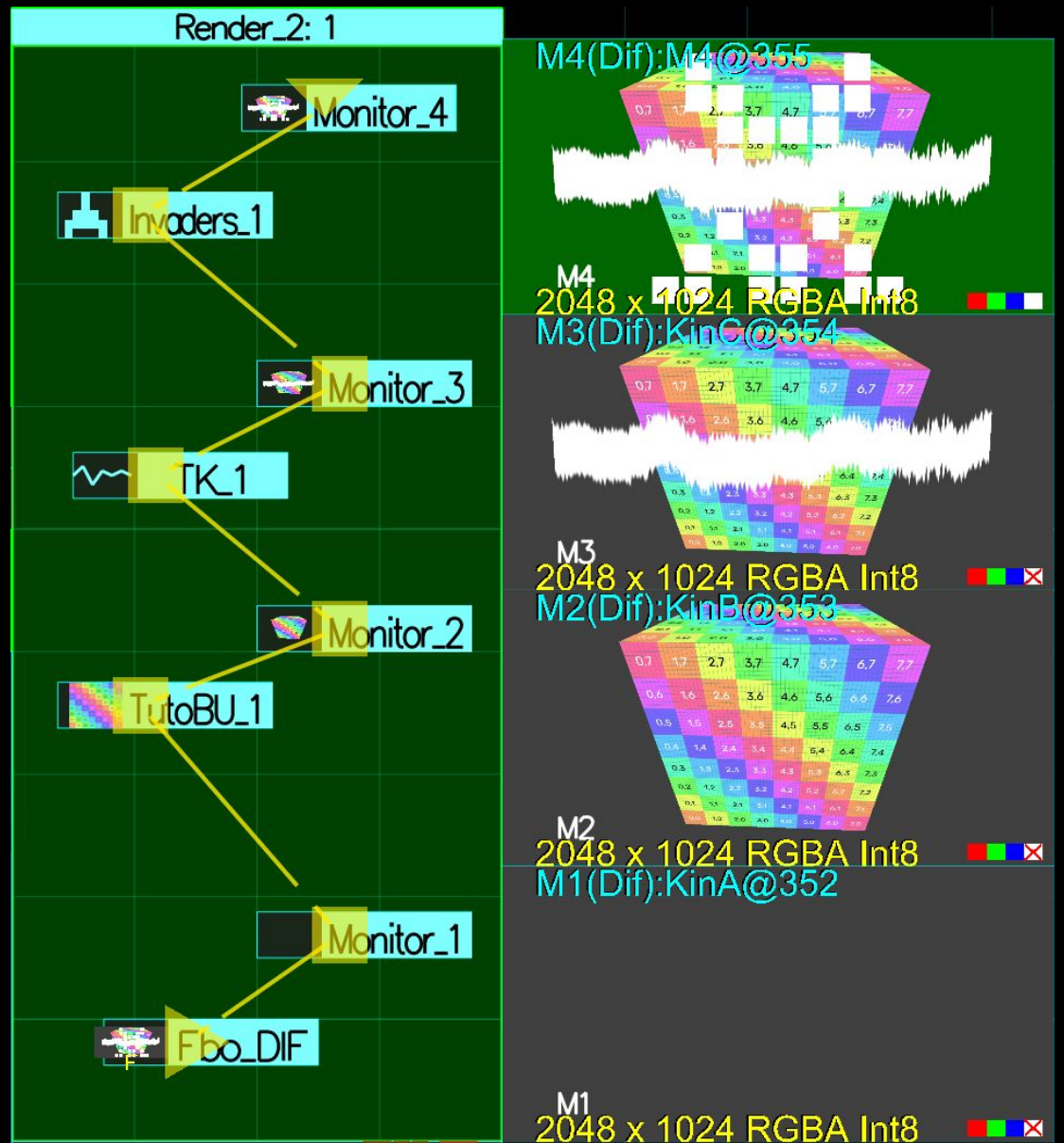
  See what is going on in the render chain

  Provide control monitor at different stage in the control chain



- Copy texture attachment in its current state to a texture associated with the MEU Monitor

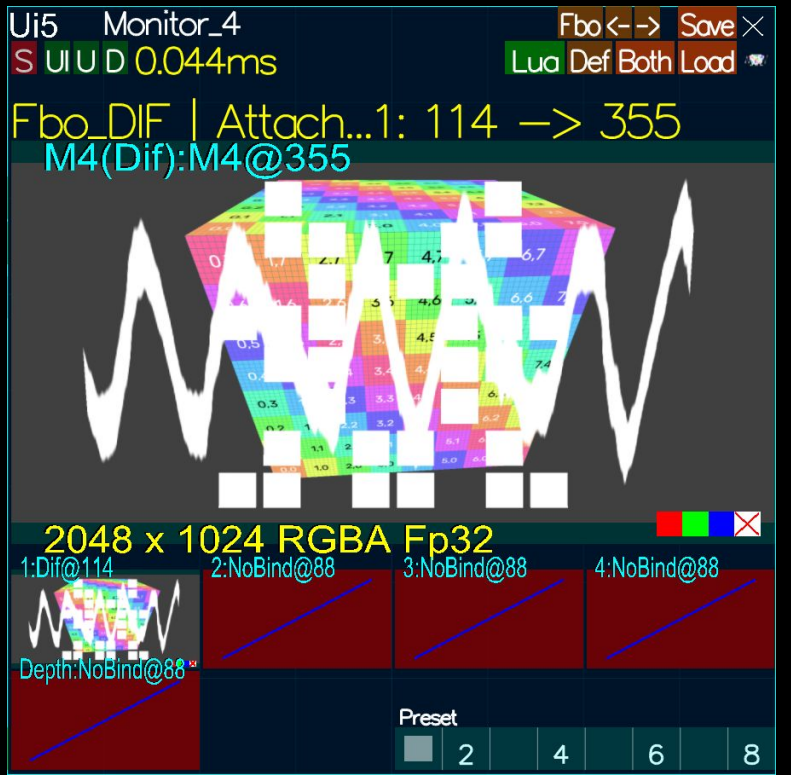
• MEU Monitor Copy Fbo attachment



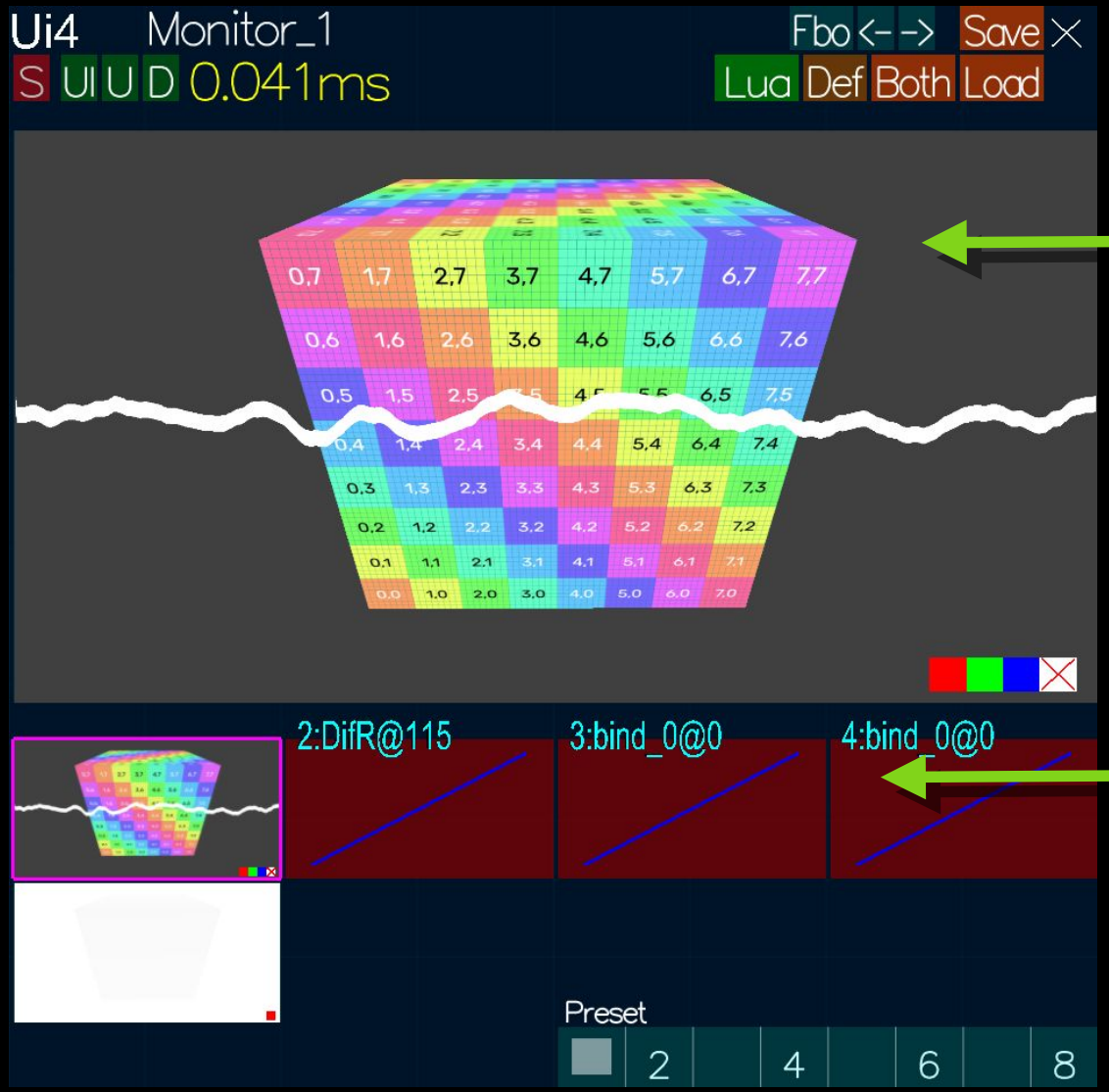
- Here 4 MEUs Monitor let us see how MEUs in the render chain draw one by one in the same fbo.
- In fact each MEU Monitor also save a copy of the attachment (texture) in is own texture bind

  M1, M2, M3 and M4

  352, 353, 354 and 355 in term of flat bind.



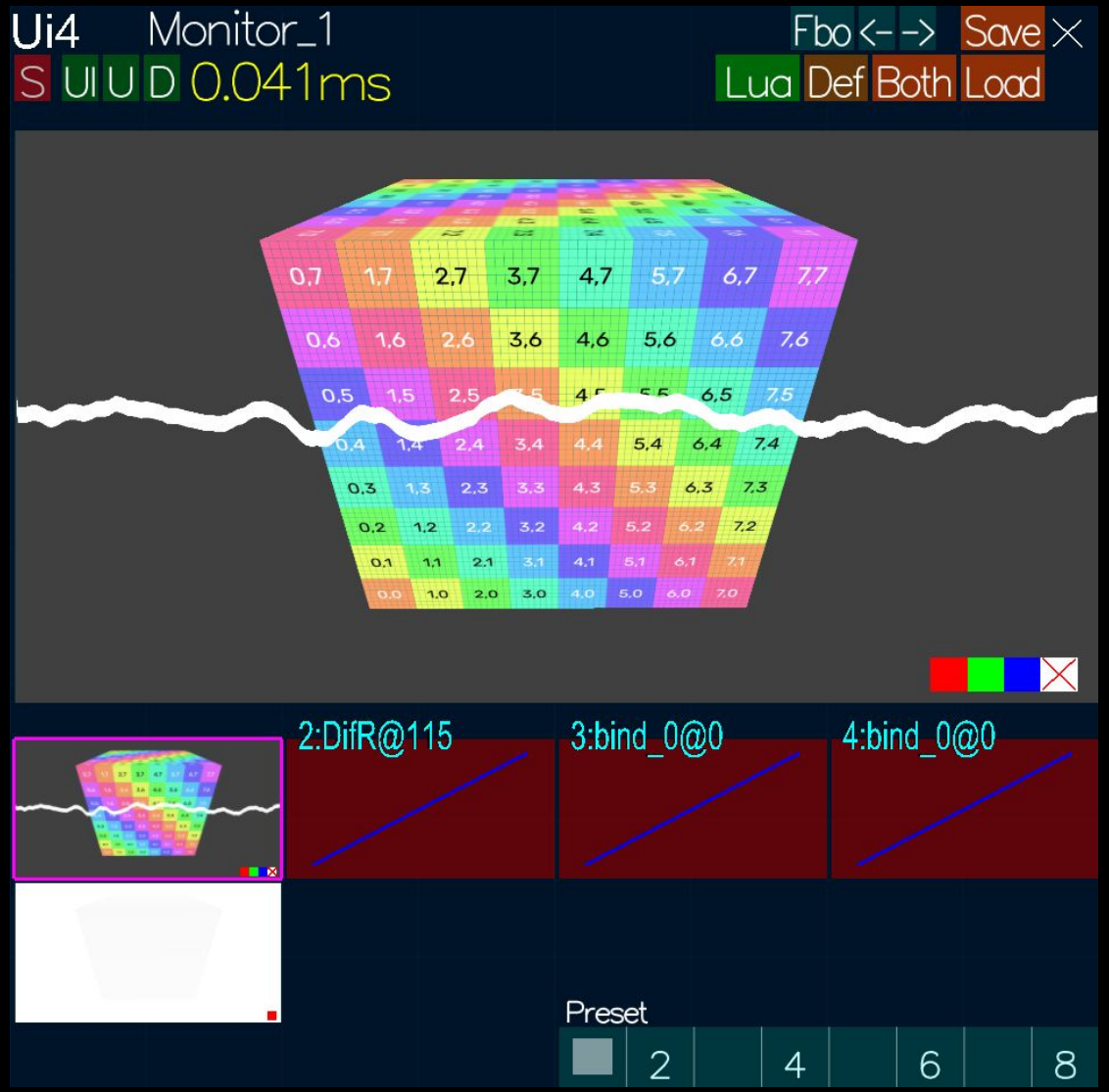
MEU Monitor Ui



- Show Selected attachment
  Double Click open associated monitor.

- Select which attachment
  is copied and displayed

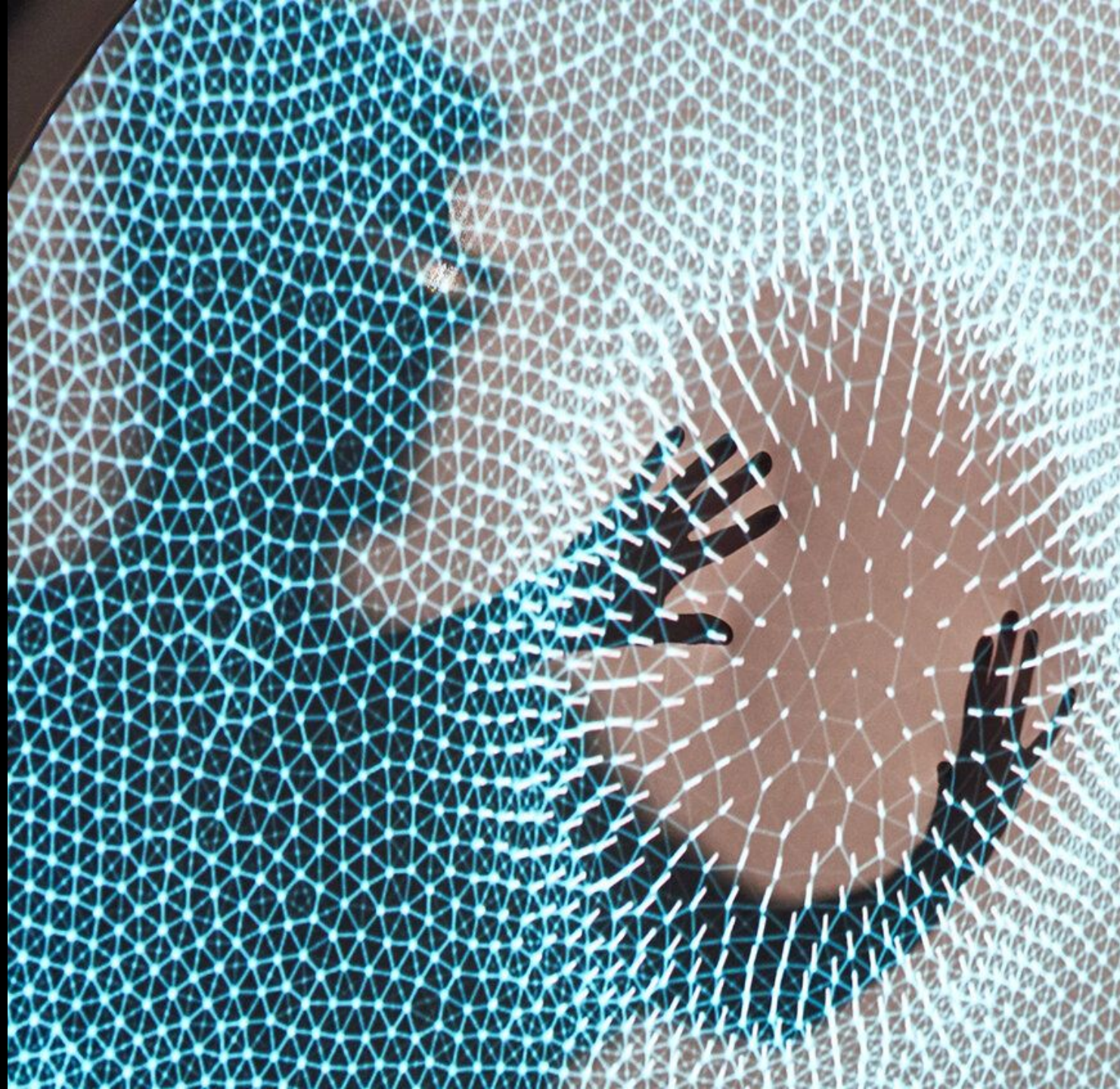
MEU Monitor as a “texture plug“



- It really does texture copy
  - yes it have a cost
    - Copy time
      - Done at low level on Gpu
        - fast so low cost
    - Synchronization
- Destination is texture named M1 to M32
  - Monitor should be named Monitor_1 to Monitor_32
- Destination texture can then be used
  - so the Fbo attachment copy can be used by other meu later in the render chain. The Monitor’s MU position in the render chain can be changed on the fly, picking the texture we want without altering the rest of the render chain.
  - So we can“plug” any stage of the render chain as input for others Meu.
  - This is“an input texture plug“

AAASeed
An introduction
Part 18:
Create MEU

- Base MEUs
- MEU Window
  - **Info and selection**
- MEU Import



Base MEUs

- **The ones we already describe in this introduction**
  - **Dir** → **Encapsulate MEUs**
  - **Fbo Frame Buffer Object** → **Canvas where we draw**
  - **Monitor** → **Display and copy the current state of the current Fbo**
- **The ones we describe in rest of this introduction**
  - **Video** → **Decompress video in a texture**
  - **PIP Picture In Picture** → **Display a texture**
  - **Out** → **Ouput a Texture** for screens, multi-screen, Led wall ...
  - **TRAX** → **Plug BU in and out**
- **The ones you need**

  Depends on your field, what you want to do
- **The ones to learn**

  MEU Tuto...
- **The ones you make**

  AAASeed let you customize and/or add your own MEUs

  Another document to come

MEU Window

- Navigate MEU

  Mouse Wheel anywhere

    Scroll list

  Mouse over item

    Display Type Info

- Click on item

  Open StarMenu

  New

    Create a new instance of this type

    A dialog let you choose the instance name.

    The new instance will appear under the Unused button.

  Lua

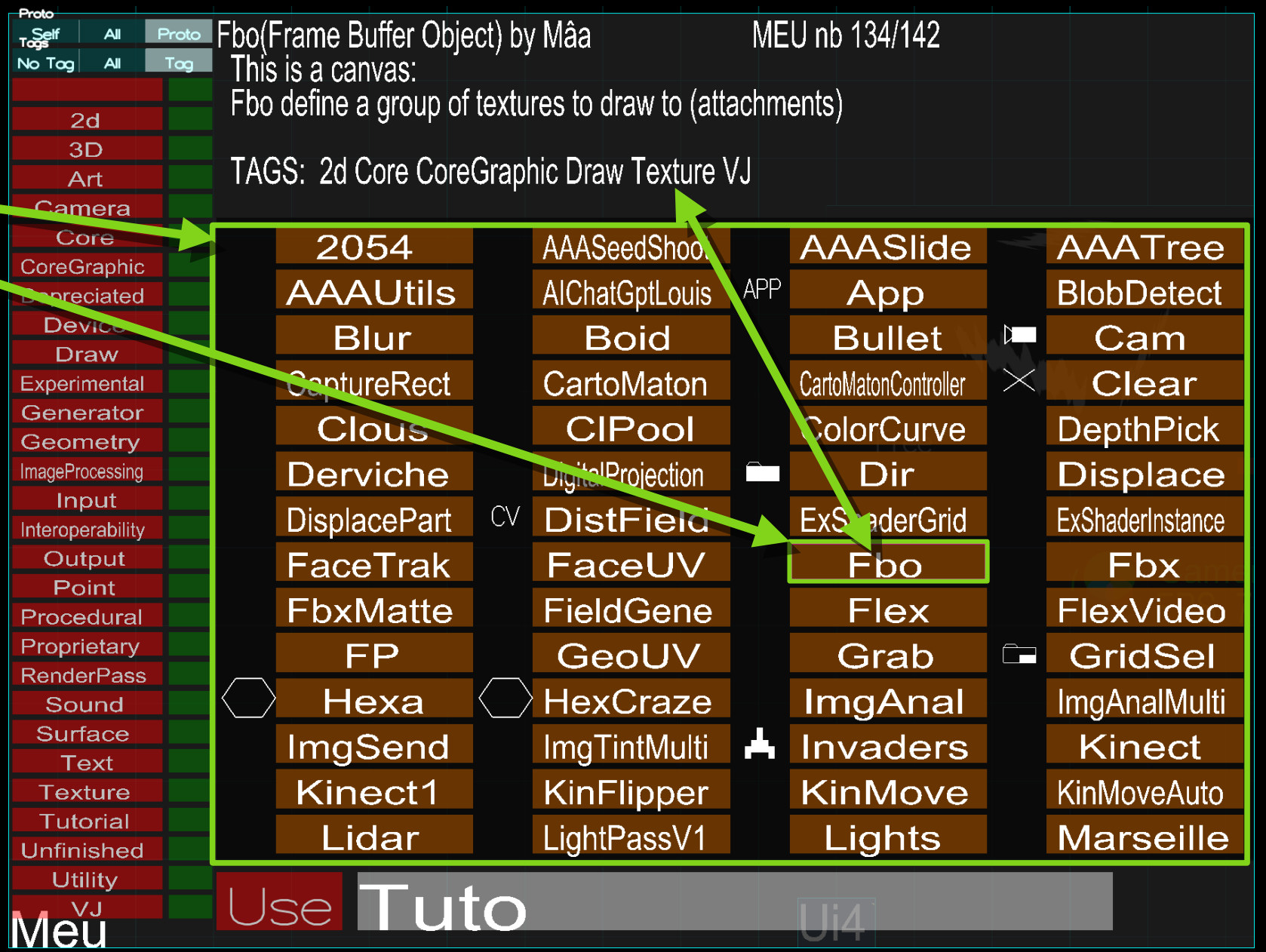
    Open the lua script for this type

  Dir

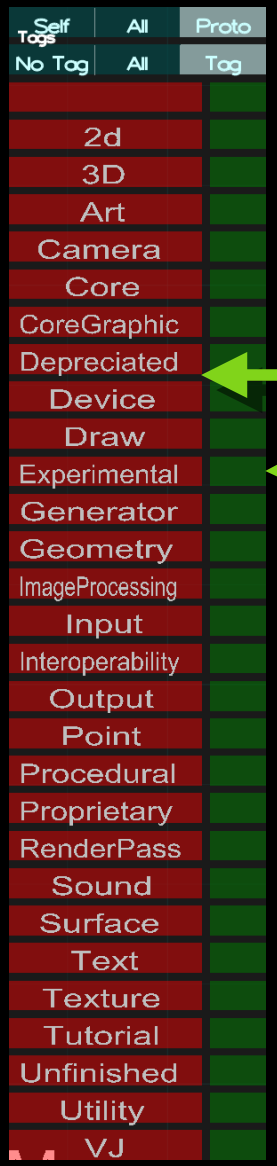
    Open with the file explorer the directory where the prototype is.

- Double Click on item

  New like StarMenu



MEU Window



- **Info zone**

  it displays information defined by MEU type

  Type name (Type long Name)

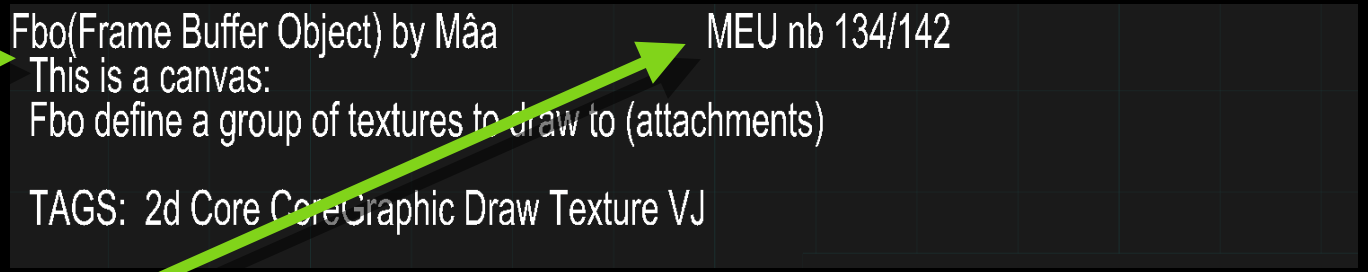
  Name by author

  Date and version

  Documentation

  TAGS for this type (used for selection)

  – **number type shown / number type existing**



- **Select by Tag**

  selection is all Tags active (On/Green)

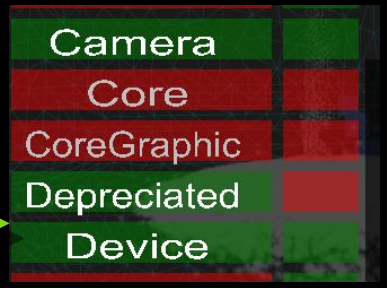
  Button at right of Tag button

  On/Green → tag wanted

  Off/Red → tag excluded

  Here we want Types with

  (Tag Camera) and (not Tag Depreciated) and Tag Device



  button Red/Green at top set all button under

- **Select by Name**

  activate the **button Use**

- **Proto** type selector

  Self → show only types for which an instance is its own prototype. We talk about **self or local prototype.**

  Proto → Show types which have a prototype inside a MEU_PROTO folder. We talk about **isolated prototype.**

  All → show all: don't select on prototype local or isolated

- **Tag** selector

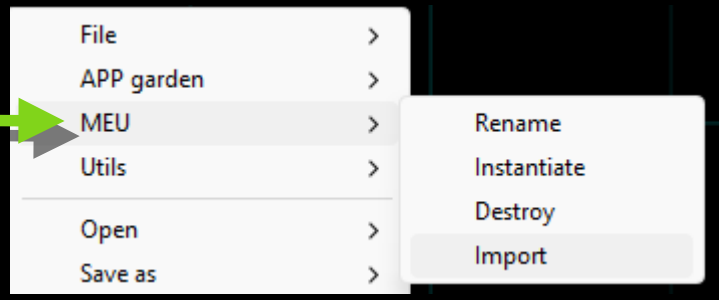
  No Tag → select only type for which no tag are defined

  Tag → select only type for which tag are defined

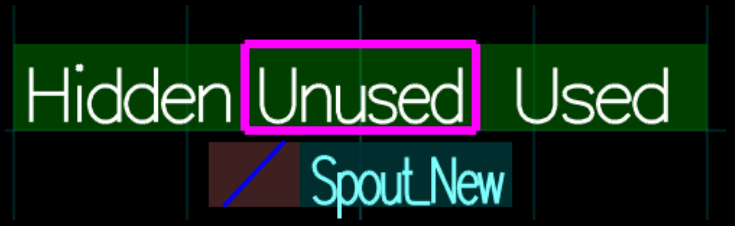
  All → show all: don't select on presence of tag or not

MEU Import

- to create MEU we know already
  - 1/ Use MEU Window (previous 2 slides)
  - 2/ instantiate an existing one
    - Use StarMenu
    - Drag a MU and release with Control Key pressed
- We can also import a MEU for another APP
  - Use Main Menu

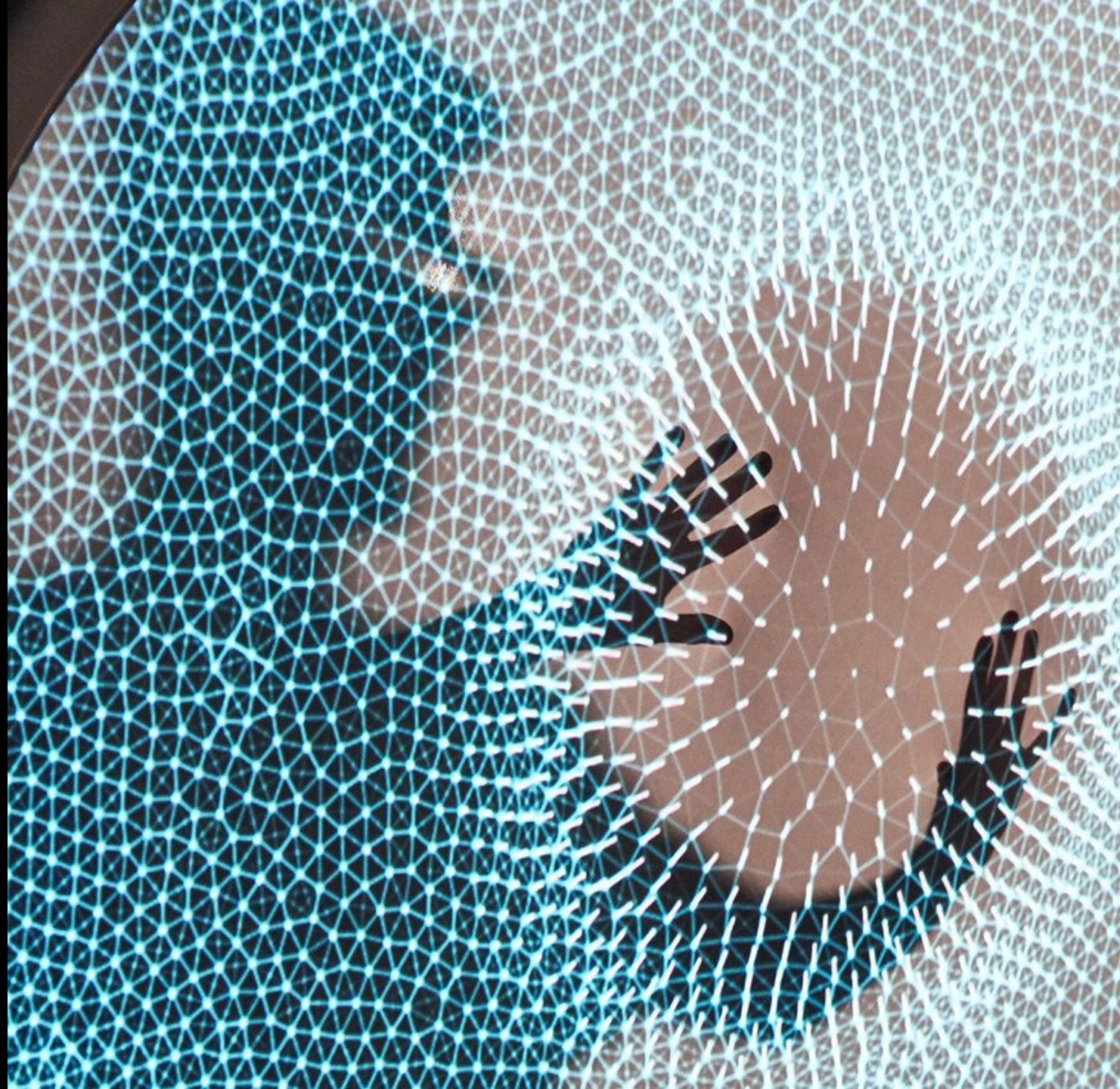


  - a File dialog is opened
    - Navigate to any APP folder
    - Open folder AAA_MEU
      - eventually if it a MEU_DIR folder you will find again an AAA_MEU folder inside...
    - Select a folder
    - Validate
  - a copy of the directory is added to your current App and the instance Appear under the Unused Button

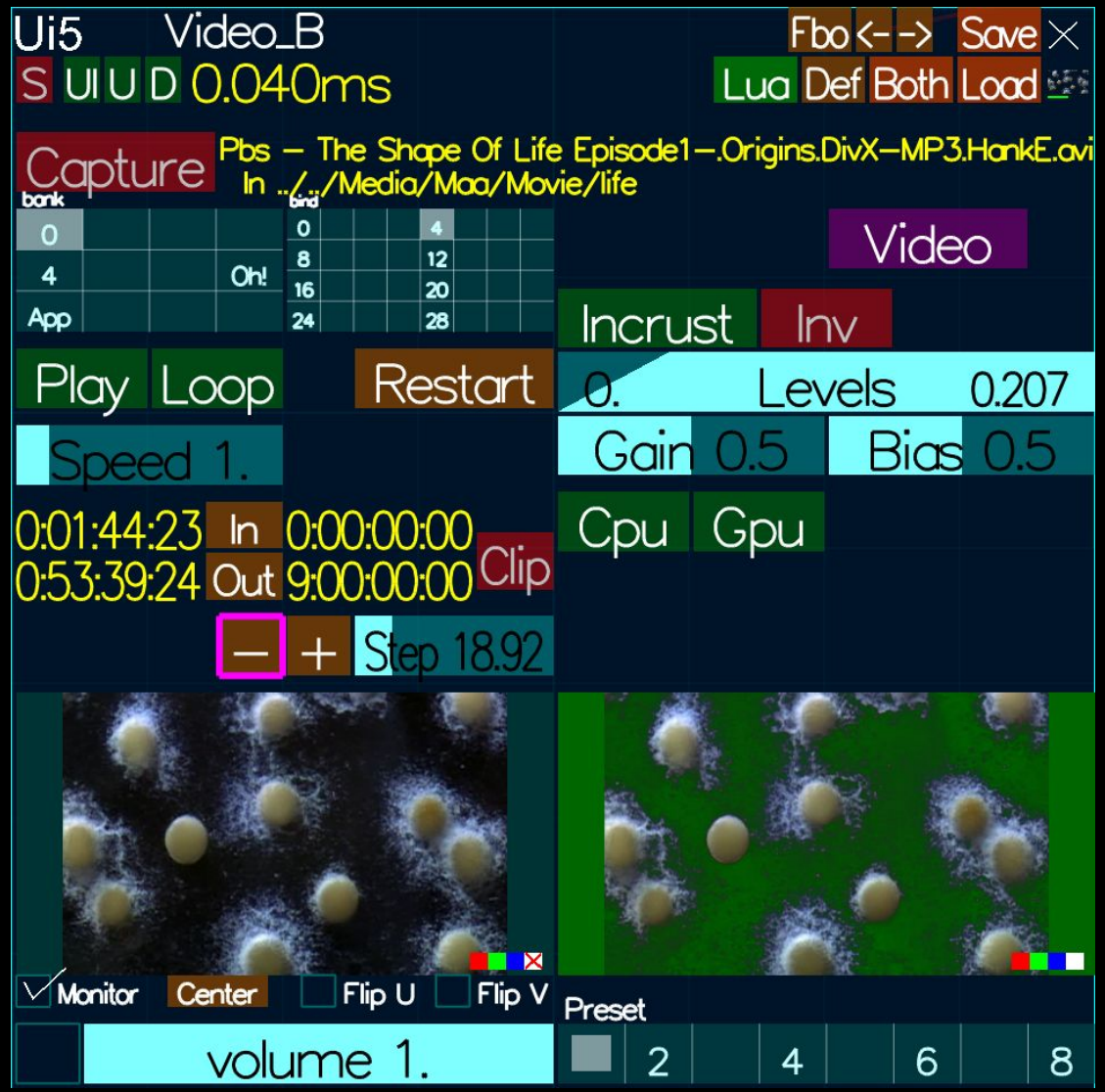


AAASeed
An introduction
Part 19
Reading video

- Meu Video: Send an Image stream to a texture
  - **Read video File**
  - **Capture**
- Meu Video
- Gain Bias

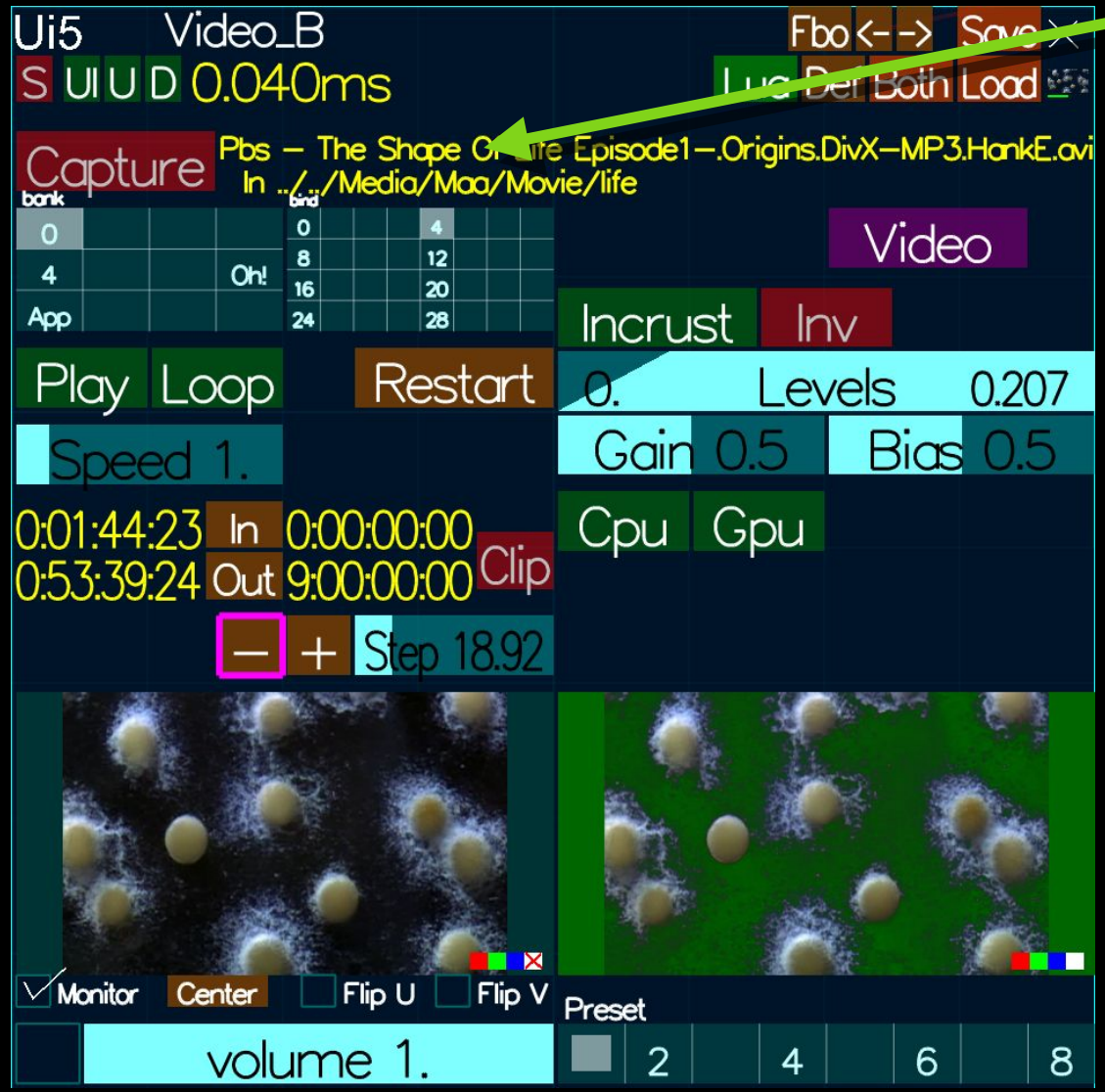


Meu Video: Send an Image stream to a texture

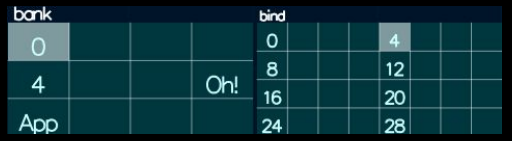


- MEU_Video deals with an image stream:
  - It decompresses a video file
    - It uses different method for that and codecs need to be installed for that (See part 2 Install).
    - Video can be started, stopped, looped, skipped, read at different speed, clipped...
  - It captures a live input
    - Configuration using flatland
      - Not the object of this document
    - Cameras
      - webcam
      - industrial
      - Kinect V2/Azure (as regular camera), PS3....
    - Capture devices
      - Capture cards
      - Usb capture cards devices
    - Display Grabber
      - Can grab any part of windows screens: any software can be an image input
  - done on the CPU side
- MEU_Video does incrustation
  - Luma (Luminence) incrustation for now (2025 September)
    - Color incrustation done by MEU PIP on the Gpu side
  - done on the CPU side too
- MEU_Video transfer the image to a texture
  - a CPU to GPU transfer
- MEU_Video have an associated external monitor (A to L)
  - Can be setup in the Ui

Meu Video

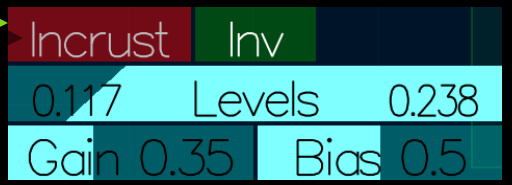


- **Video Name and folder**
  - **Red when there is a problem: look at terminal window**
- **Bank / Bind like texture**
  - **12 banks of 32 binds**
  - **2 selectors**
  - **Click double**
    - **Pick a video for the video bind**



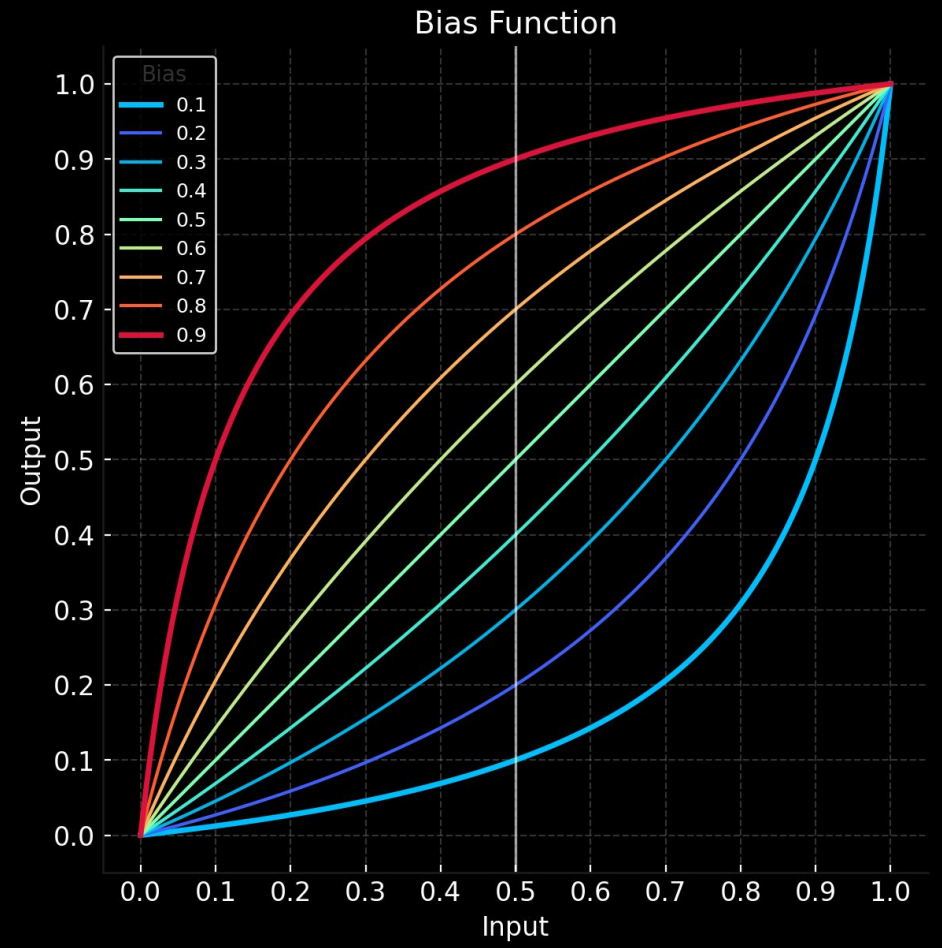
- **Play / Control**
  - **In / Out / Clip → play a subpart**
  - **- / + → move in time by Step increment**

- **Monitor (Ui as MEU_Fbo)**
- **Volume**
  - **On/Off button** and **Slider**
  - There is a master Volume Too
- **Capture → switch to capture mode**
  - more in a separate document
- **Video** → Focus on c_tex_video in **Flatland**
- **Incrustation**
  - **Luminance Incrustation**
  - **Inv**erse → inverse the curve
  - **Levels** → min max levels of incrustation
  - **Gain / Bias** alter the shape of the transfer curve (see next slide)



- **Cpu and Gpu**
  - **Where we keep it**

Gain Bias an electronic heritage

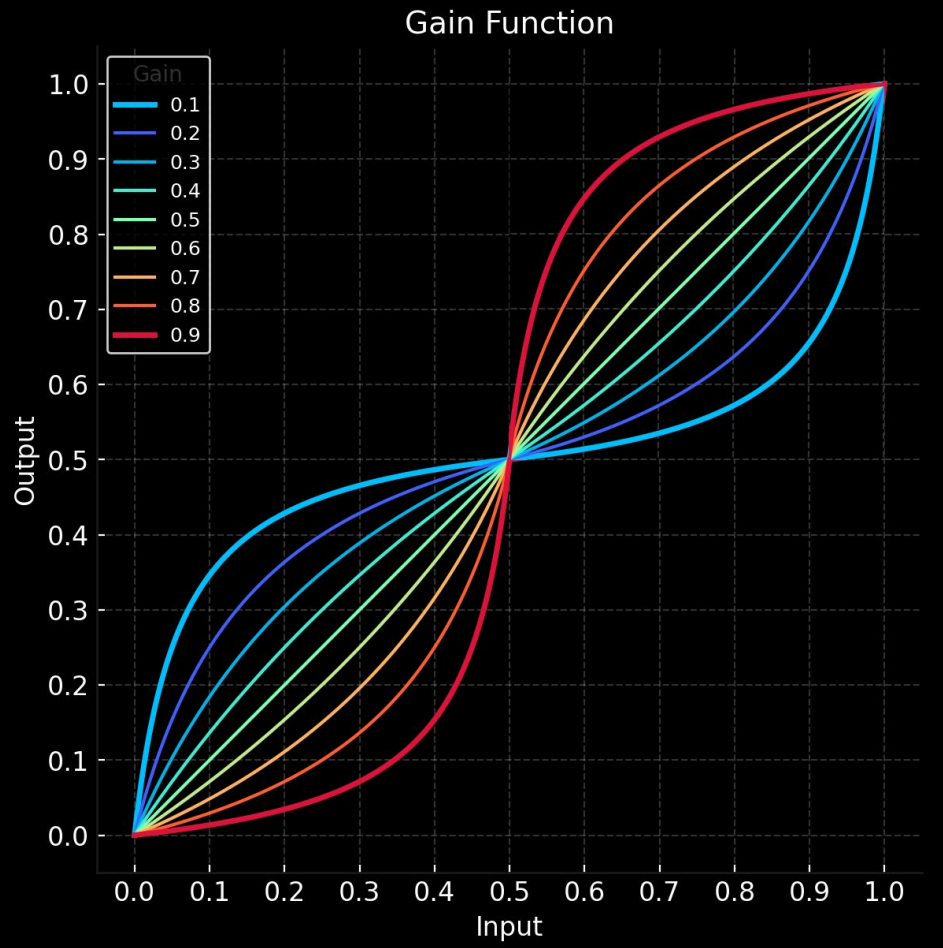


Input at 0.5 : Bias value

Low Bias → Push values down

0.5 → Straight curve

High Bias → Push values up



Double Bias curve (symmetry **in the middle**)

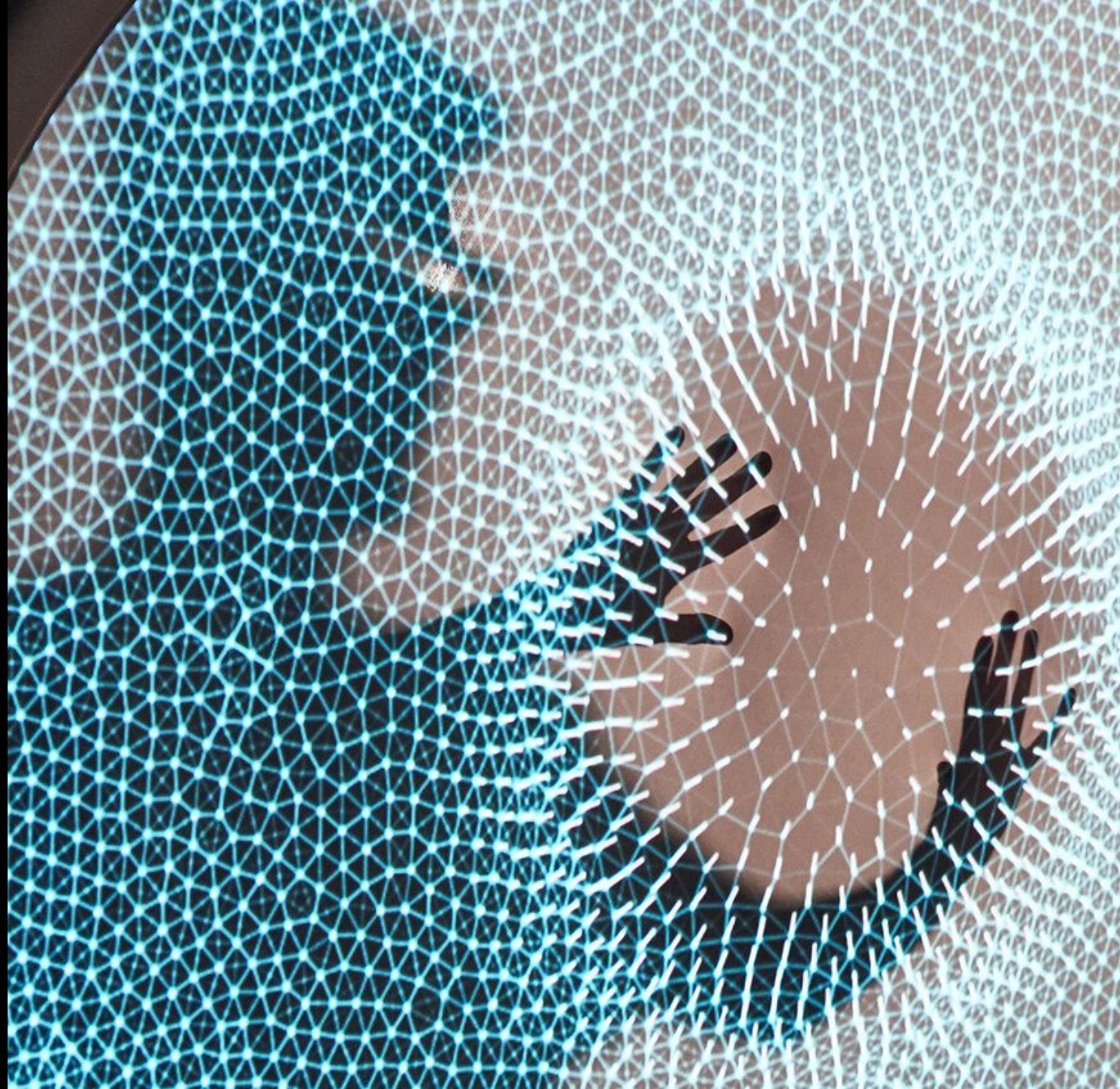
Low Gain → Push **value to middle**

0.5 → Straight curve

High Bias → Push **values to extreme**

AAASeed
An introduction
Part 20
Drawing texture

- Meu PIP: Picture In Picture
- Main tab left
- Main tab right
- Ratio and Size
- TRS
  - **Translate Rotate Scale**
- Map tab
- Blending



Meu PIP: Picture In Picture

- **Picture In Picture**
  - from the **video world**
    - Drawing a video in a rectangle
- **MEU_PIP draws a texture in a rectangle**
- **MEU_PIP does much more**
  - **Crop the texture** used
  - **Handles smooth transition** of texture
  - **Performs Incrustation on the Gpu**
    - Luma (Grey)
    - Color
  - Composes with a the **texture mask**
    - **using its alpha or a Remap** (luma incrustation)
  - **Sizes the rectangle**
  - **Transforms** the rectangle **in 3d**
  - **Recolors** the output
  - **Clamp the color**
  - **Add a fuzzy edge**
  - **Composites with the Fbo**
  - Does even more, but not the coffee or tea

- **Part of its Ui are generic** and used in other Meu type, and will be **detailed here**

Meu PIP Main tab left

- **Tex** selects next Texture to be displayed
- **Inverse** → Inverse the RGB colors (**negative**)
- **Incrustation**

  Incrust → **toggle Incrustation**

  If active the **alpha produced** **replace the texture alpha**

  2 modes to produce the alpha values

  Luma (Luminance)

  use the grey from the texture

  Color

  use the distance to the color

  Luma SLIDER_TWO **define the curve** used to transform grey or color distance to alpha

  Inv Button **flip the Luma Min/Max** values
- **Swap** → swap **texture and mask**
- **Mask**

  Mask → **toggle mask use**

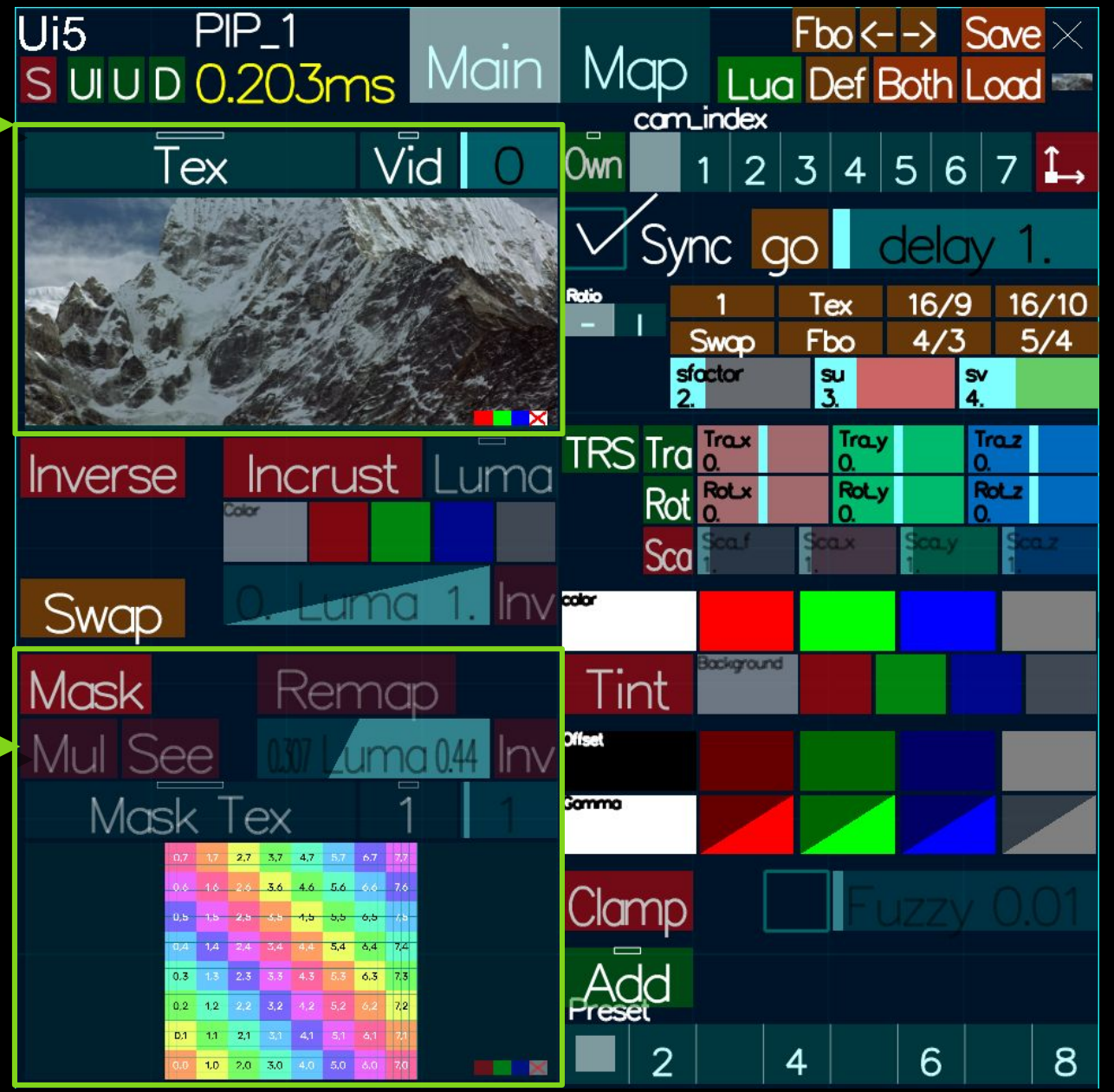
  Alpha used is the **multiplication** of **texture alpha** and **mask alpha**

  Remap acts like a **luminance**(Luma) **incrustation** for the **mask**

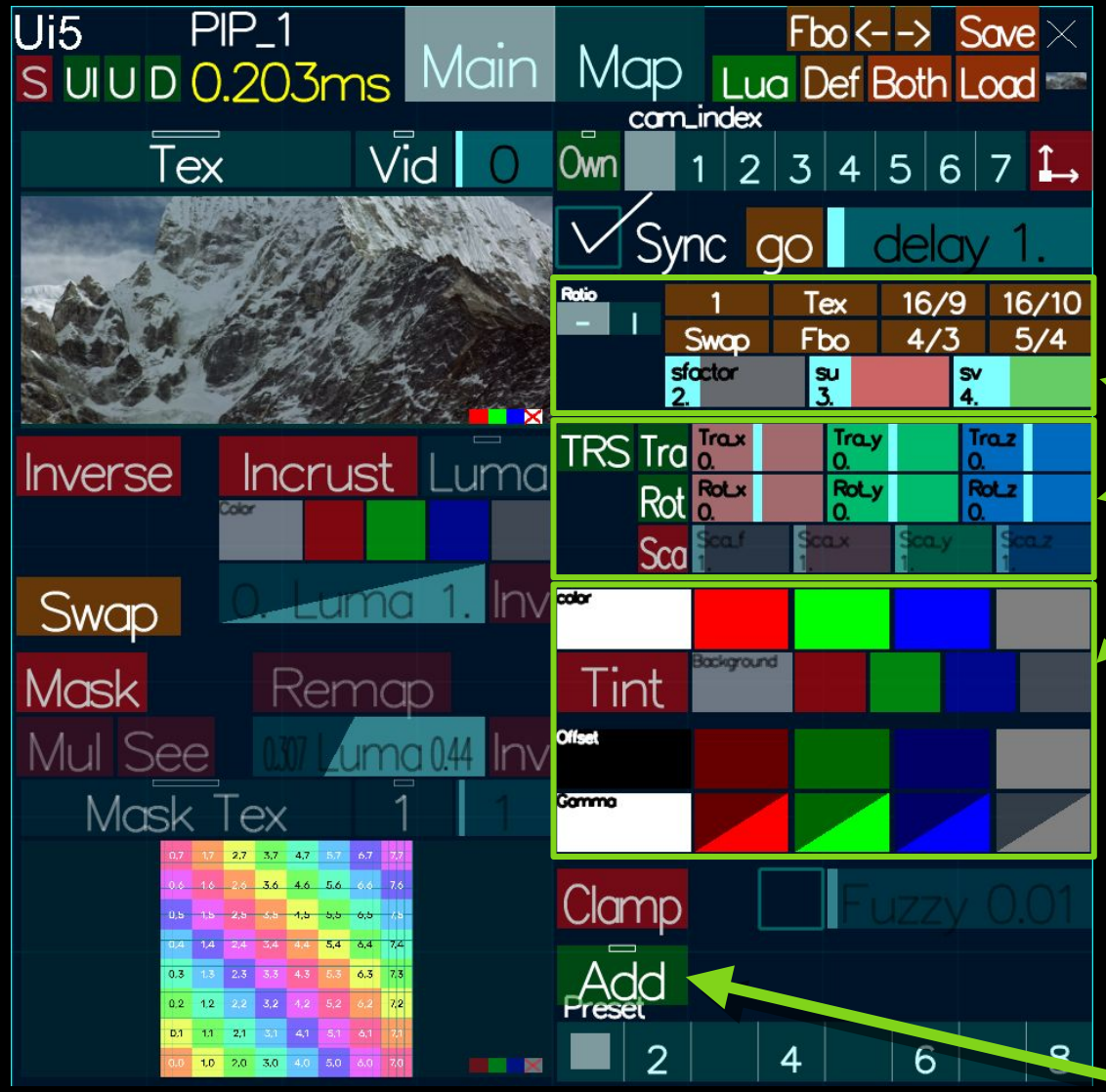
  Mul means **Mul**tiply it activates the **multiplication** of **texture rgb** by **mask rgb**

  See button shows the mask, ignoring the texture

  Mask Tex selects texture used for mask



Meu PIP Main tab right



- **Cameras**

  The Usual, See Part Cameras & Axes

- **Sync**

  if **active** the texture **transition is automatic**

  Go triggers manually the transition

  Delay control the duration of the transition

- **Size of the rectangle** (see next slides)
- **TRS** (see next slides) move the rectangle
- **Color maniplation**

  Color multiplies the texture color

  Tint transforms the texture grey into an interpolation between background color and color

  Offset is added to output color

  Gamma performs a gamma transformation to the output color

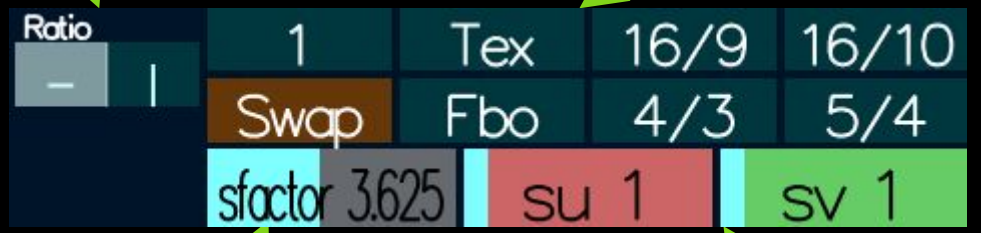
- **Clamp limit the color ouput to the [0,1] interval**
- **Fuzzy** adds a transparent border at all edges
- **Blending** (see next slides)

Ratio and size (used in other MEU type)

- This changes the **sizes used by a MEU to render a rectangle**

Select direction the trigger buttons affect: here u (horizontal)

Trigger buttons change the slider su or sv to match the ratio asked. Tex → Texture ratio



Size Factor: multiplies size in u and v direction

Size u and v: u (horizontal) v (vertical)

TRS ↔ Translate Rotate Scale (used in other MEU type)

- This controls what is named in 3D: a **transformation**
- **Changing** where an **object is drawn**
  - **Not moving the camera**
  - Developer note
    Alter the model (model to world) matrix
- **Combine 3** Types of **transformations**
  - **Tra ⟶ Translate**
    position of the center
  - **Rot ⟶ Rotate**
    rotate around the center
    Rotation unit in AAASeed is trun/revolution
    0.25 ⟶ a quarter turn
    0.5 ⟶ a half turn
    1 ⟶ a full turn
  - **Sca ⟶ Scale**
    Scale around the center
    Sca_f (Scale factor) multiplies individual axe values
- Better **keep button TRS Off** if transformation is **not used**

General button
allow global TRS use

Individual buttons
allow each tranformation

Meu PIP Map tab

- **nb_u, nb_v**

  the textured **rectangle** drawn by Meu PIP **is** in fact a **grid**. This controls the **numbers of points** (and so subdivisions) **of the grid** in both directions

- **U Min/Max, V Min/Max**

  controls which part of the texture is used

- **Hexa**

  Fun mode to map with hexagonal symetry: please experiment

  du, dv

  offsets

- **UV Bdd Src**

  Allow to use **UV mapping generated** from a bdd, usually a c_bdd_grid_adjustable used to edit a deformation in conjunction with an source image. **See Meu Out in next Part.**

  Uncheck if you don't know what you do

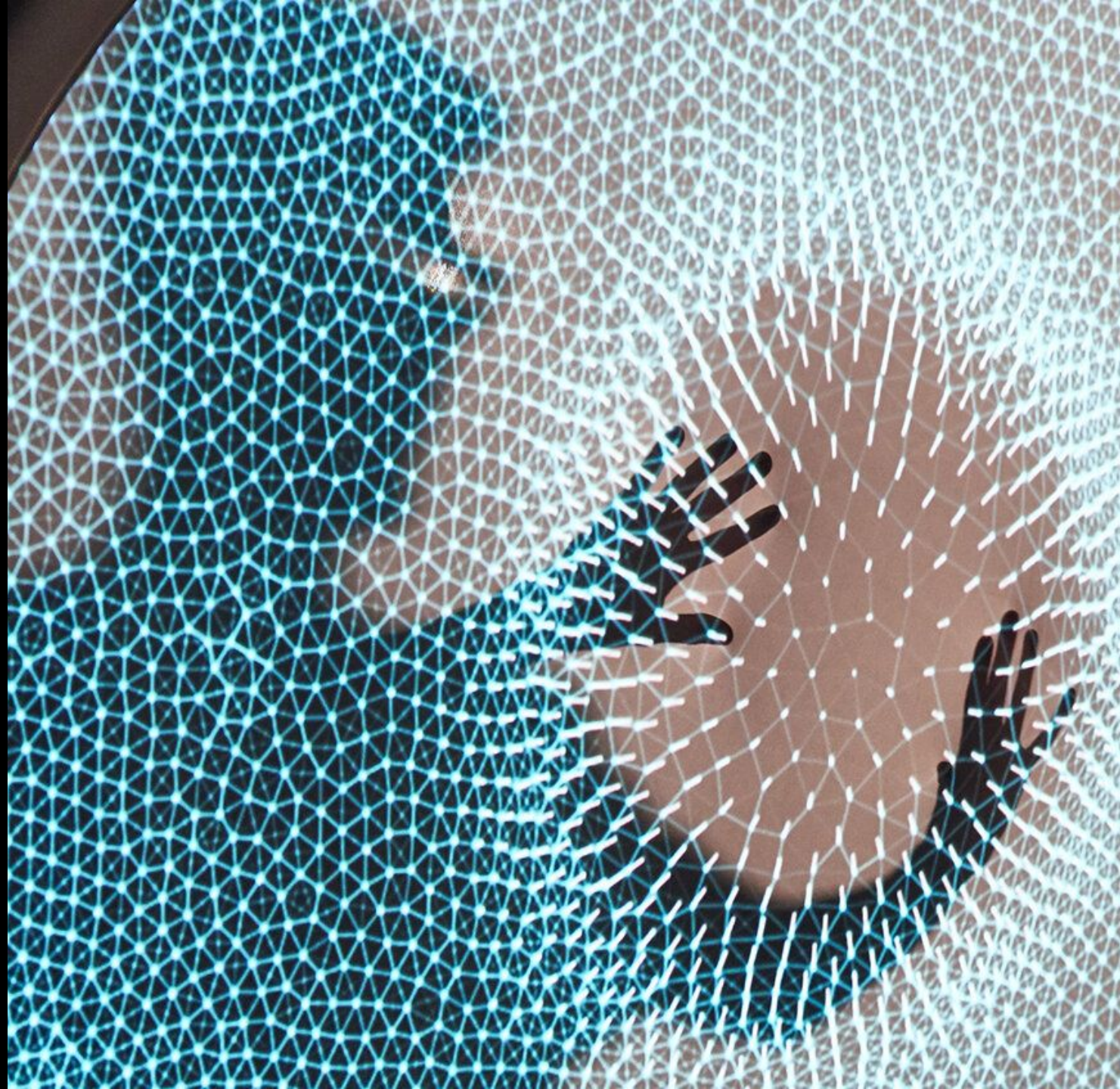
Blending (used in other Meu type)

- This small and perhaps too discrete BU controls **Blending**

- **Blending**
  is **how the pixel produced by the MEU,**
  called a **fragment** at this stage,
  is applied to the Fbo.
  In fact it controls what is called the **blending equation**
- **it is applied channel by channel :** R,G,B and Alpha
  Min: use the **Minimum** between **what you draw and what is in the Fbo**
  Max: use the **Maximum** between **what you draw and what is in the Fbo**
  - **Add**: use an **Addition** between **what you draw and what is in the Fbo**
    using Alpha to do transparency
    destination = fragment * alpha + fbo * (1-alpha)
    This is the default mode and what you should use in general
    the blending BU are drawn with a discrete flashing when value is not Add
  Sub: use the **Substraction** between **what you draw and what is in the Fbo**
  RSub: use the **Reverse Substraction** between **what you draw and what is in the Fbo**
- **Other modes correspond to photoshop compositing modes** : please experiment
- More on blending modes at interactive web Blending application

AAASeed
An introduction
Part 21:
Outputting image

- MEU Out
- Main tab
- Edit Deformation Grid
- Fuzzy edges
- Map tab
- Rendering BUs



MEU Out

- **Handles Final output**

  to screens, projectors or LED walls
- Its main function is to **set up an Ouput quickly**
- **MEU_Out like MEU_Pip draws a texture in a rectangle**
- **MEU_Out**

  Crop the texture used (tab Map in next Slides)

  Draw the texture to a selected screen (Windows screen)

  Size the rectangle

  Deform the rectangle

  with a **real time editor** made for difficult conditions

  Output pixel exact image

  to deal with **Led walls**

  Add fuzzy edges (feathered, blended edges)

  editable for each edge

  Can also draw to an Fbo

  nice to have **deformable editable grid there**

  Composites the outputs

  Can be used as a texture UV Editor too
- Part of its Ui are generic and used in other Meu type, and will be detailed here

MEU Out Main tab

- **Draw** should be **On**

  Or **Off** if the deformation is used somewhere else but should not be displayed (document on this will come)

- **Use Fbo** button

  Off → draws to screen

  On → draws to current Fbo

- **Top** show the **grid drawn** on top of the texture drawing

  this is the drawn grid **not the deformation grid**

- **Crop** use the **crop defined in the Map tab** (see next slide)

- **Force** forces the **display** according to the **selector to its right**

  quick way to switch the output

  you can see better what you do

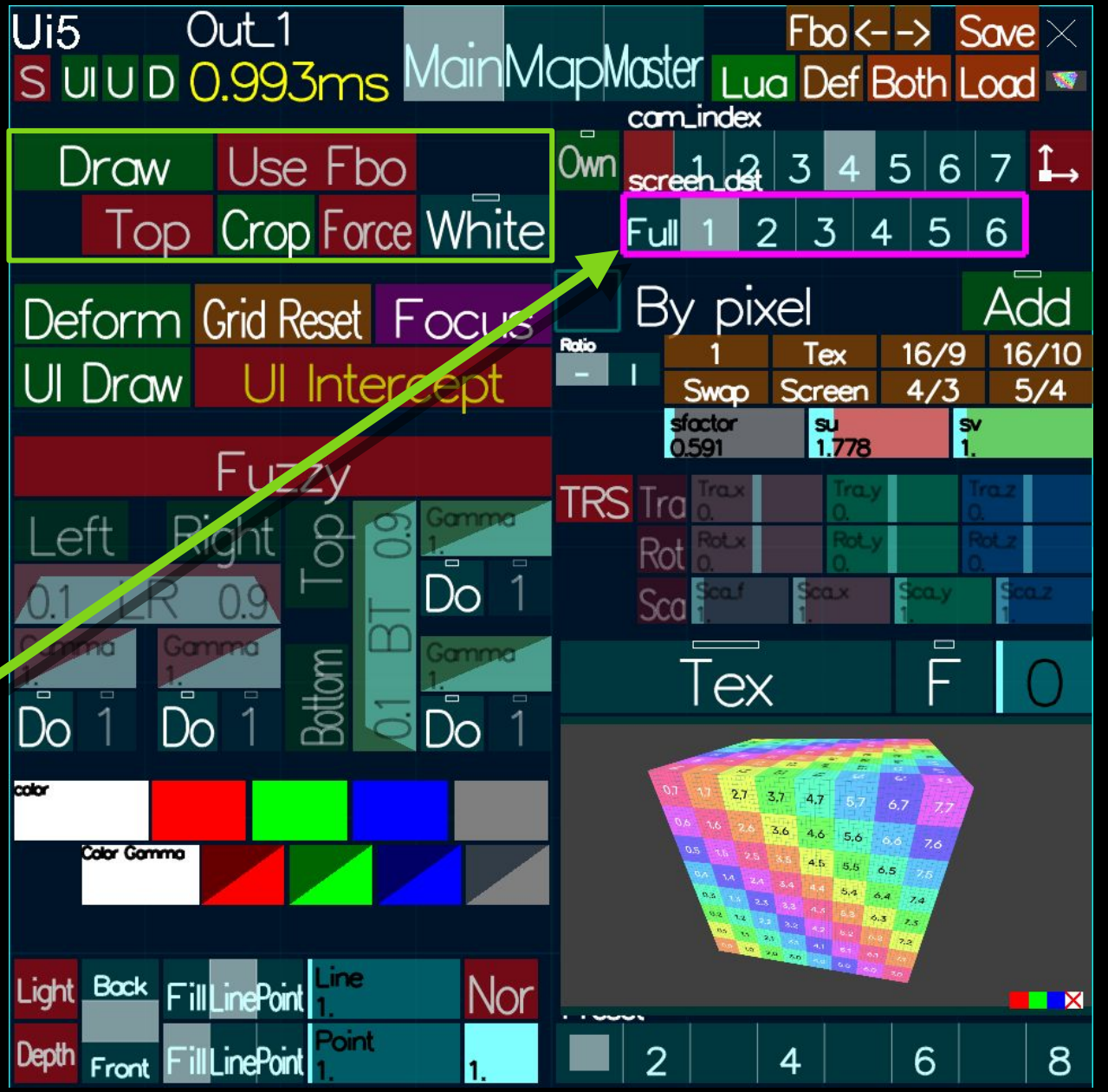
  projector can be adjusted ...

- The selector under the camera **(screen_dst) controls to which screen the meu draws**

  Full means all the window

  numbers correspond to windows Display Settings

  Here we select screen 2



MEU Out Main tab Deformation

- **Deform activates the deformation grid and process**

  When **Deform is On**, **the deformation grid take over** so any modification in the ratio and size part of the Meu have no effect.

  To **change the deformation grid size**

  set **Deform** to **Off**

  adjust with size and ratio BUs

  push **Grid Reset** and **confirm**

- **Grid Reset** resets the d**eformation grid** after a **confirmation**
- **Focus** open **Flatland** focused on the **c_bdd_grid_adjustable** used

  useful mainly to change the deformation grid subdivision

- **UI draw** show the **grid editor Ui**

  In **Blue** when edit is **inactive**

  in Re**d and Green** when edit is **active**

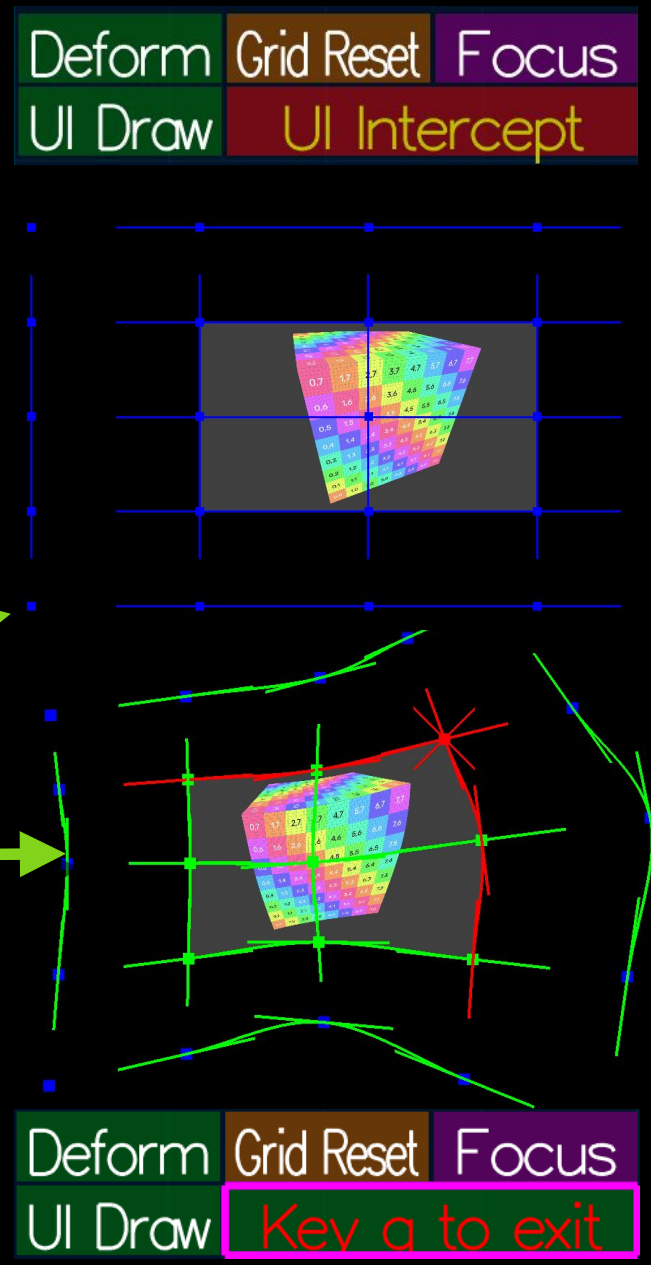
  Adjust Line and Point size to your context **(sliders at bottom)**

- **UI intercept** switches the **grid in Edit mode**

  GaBuZoMeu Interface is not usable but Flatland is

  Key q → exit this mode

  and then enter edit mode back



MEU Out Edit mode

- **Arrow Keys → change the current point**

  the one at the **intersection of the two red lines**

- **Click the mouse and Drag → move the current point**

  Some points (in Blue) can not be edited, most of the time because they are **computed automatically**.
  Here the external points.

  Ctrl and Ctrl Alt → move **more precise**

  Shift Ctrl and Shift Ctrl Alt → move **amplified**

  Ctrl z/y → **Undo/Redo** (just last move) when no flatland.

  Ctrl r → **Reset the deformation grid**

- **Keys**

  q → **(q)uit the edit mode** and then enter edit mode back

  u/v → **Constraint the movement** in the **u(horizontal)/v(vertical)** direction

  f → **(f)ree**: **remove the** u and v direction **constraints**

  Alt u/U → A**dd/Remove one point in the u direction**

  Alt v/V → **Add/Remove one point in the v direction**

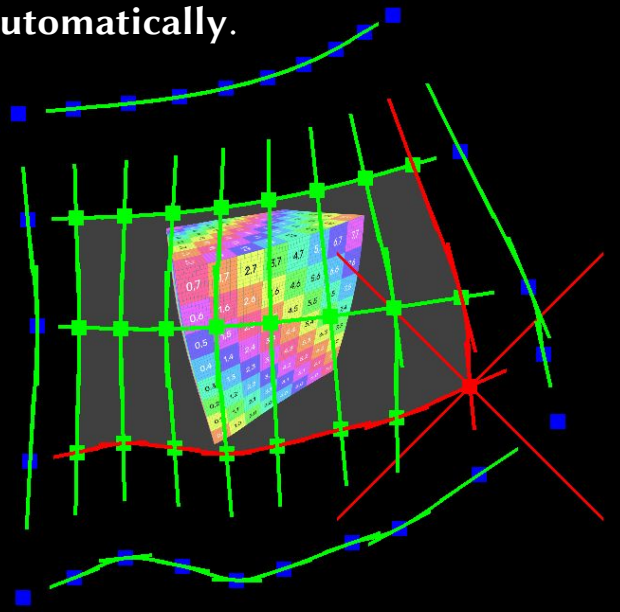
- **Flatland** (**Focus** button for fast access)

  the **c_bdd_grid_adjustable** have **more options** the meu UI:

  change the subdivision of the deformation grid without incrementing one by one

  use params curve_nb_u_new and curve_nb_v_new to set up a new subdivision
  then trigger the change with curve_nb_new_trig

  symmetry and type of deformation



MEU Out Fuzzy edges

- **Definition of fuzzy edges (blended edges)**

  used to have **seamless result** when forming **an image with several projectors, fading nicely from one image to another**, avoiding:

  - side by side images (nearly impossible to set perfectly)
  - A brighter area where the projections overlap

  – to achieve a seamless projection from two projections (a tutorial will be done on this)

  - Use deformation grids to set a **perfect geometry overlap**
  - Adjust the **fuzzy edges area on both side of the overlap**
  - **Adjust both gamma at the same time** until the overlap vanish.

- **Fuzzy** → allow edges to be rendered as fuzzy each edge have their own setting
- **Left/Right Bottom/Top → Toggle individual side**
- **LR/BT** → set the **edge area affected**
- **Gamma** is applied to transform the edge transition. But there is a mode selector

Do → Gamma slider value is applied

Set → Gamma slider value is applied and it is used to **set a global gamma** value with the chosen index. This global gamma is shared by all meus Out.

Get → get the Gamma value from a global gamma value with the chosen index, then this **value is applied**. This global gamma is shared by all meus Out.

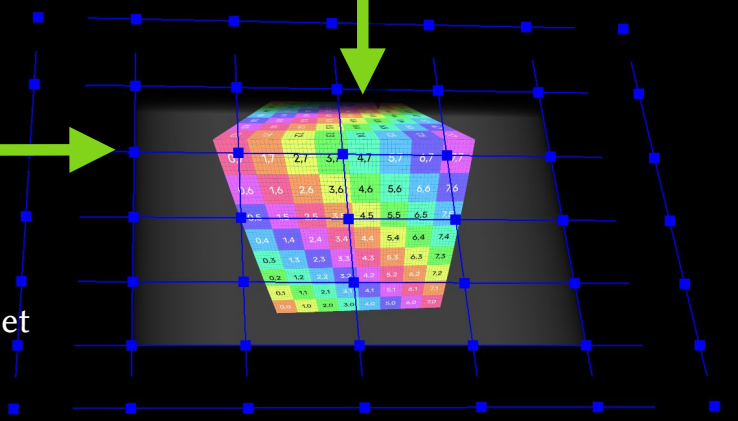
- **In our example**

  Fuzzy is done for Left, Right and Top edges.

  for **Left Gamma** is **0.339** and this value **set global Gamma slot 1**

  for **Right Gamma is read from global Gamma slot 1,** and so the value used here is **0.339** (Set by Left)

  for **Top Gamma** used is **0.924** but it does not set any slot



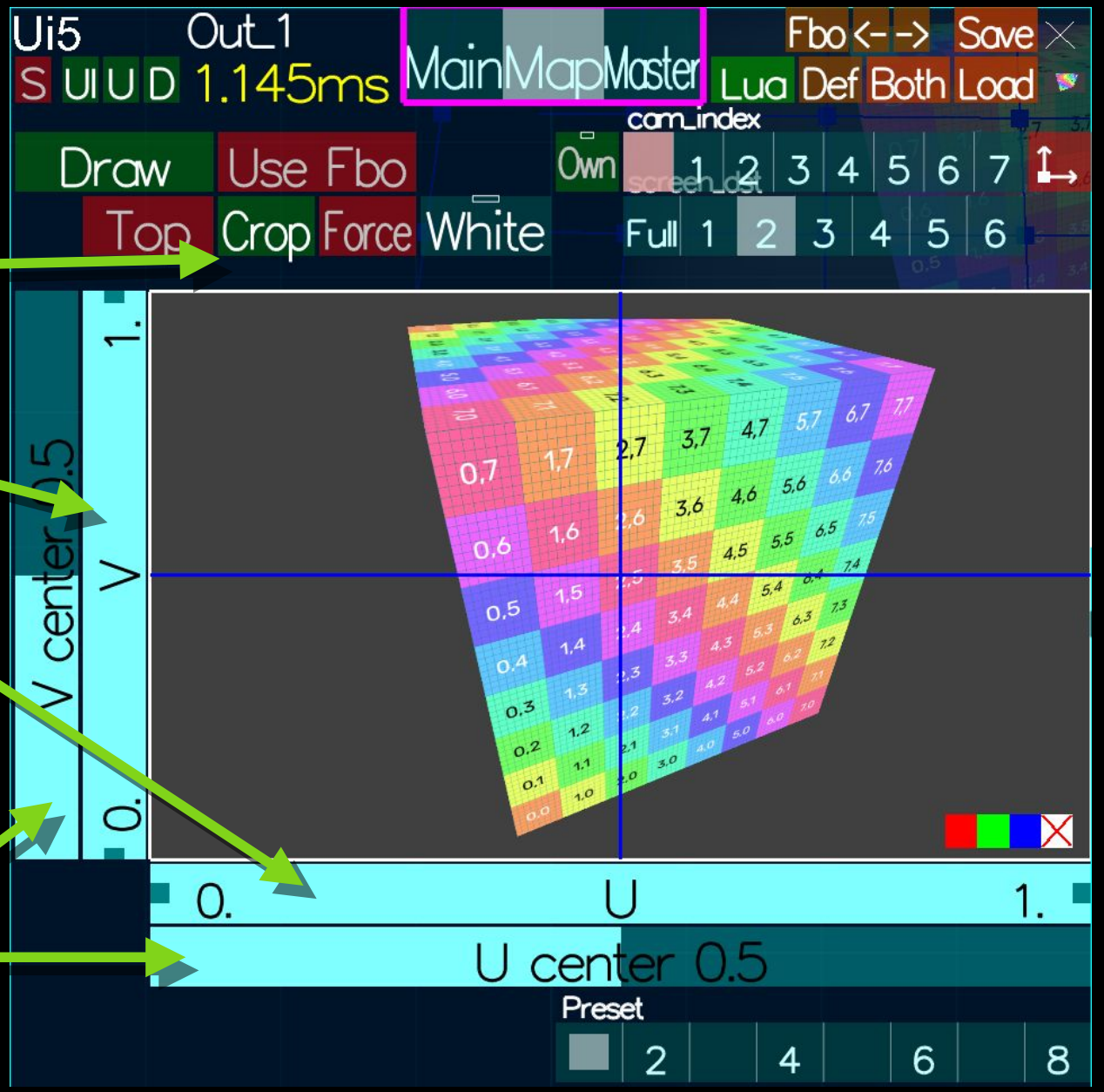
MEU Out Map tab

- Select which part of the texture is displayed

- when Crop button is On

  U/V SLIDER_TWO selects the area cropped

- U/V center just display the corresponding blue line on top of this texture monitor.



Rendering BUs (used in other Meu type)

- Control some **common** rendering parameters

Every 3d object is drawn basically with Triangles.
Each triangle is oriented and face (Front) or not (back) the camera.
We can draw

Back faces
All faces
Front faces

When applicable
Line width (in Pixel)

Some 3d object have Normal to triangle, edge or points.
Switch the Normal Display

Do we use Light ?
Don't for now until you know how it works

Factor multiplying the Normal Size to make more or less visible

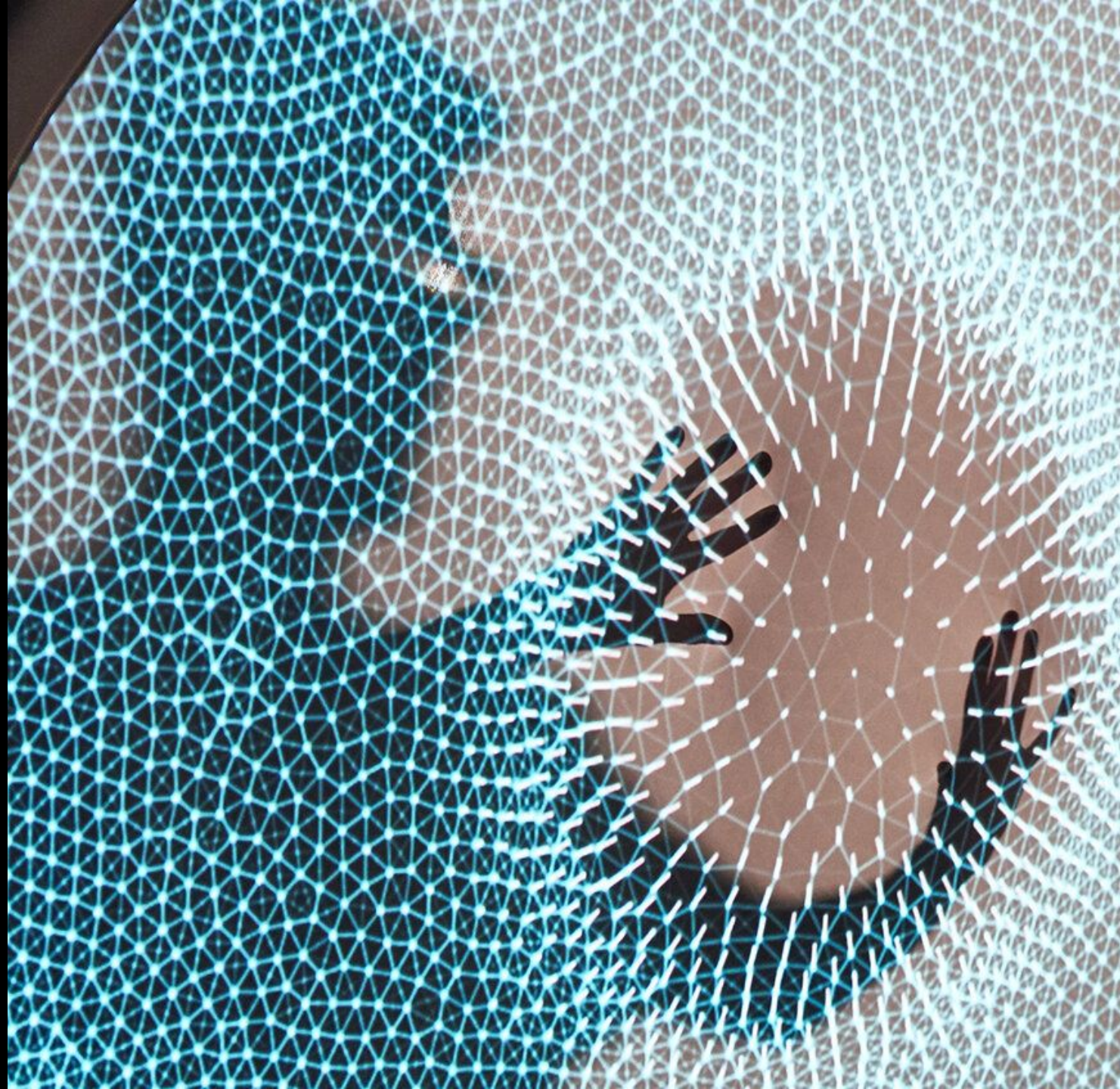
Do we use Depth (Zbuffer) ?
We need the Fbo to have a Depth attachment

Point size (in Pixel)
When applicable

Front Faces and Back Faces can be drawn using different modes.
Fill (plain) or Line or Point
These selector pick this mode

AAASeed
An introduction
Part 22:
Plugging

- MEU Trax function
- Plug 101
- MEU Trax UI



MEU Trax

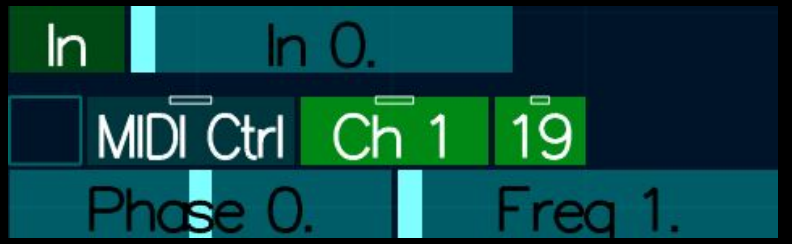
- **It gets a signal/value from**
  - **any BU in any MEU**
    - **Plug In MEU Trax**
  - **MIDI** (controller mainly)
  - **mouse or keyboard**
  - **Sound input**
  - **Internal generators**
    - sinus, saw tooth, triangle, square, random, turbulence....
- **Process it**
- **Displays it in its UI**
- **Draws it to current Fbo**
  - **Set D button Off in meu bar to avoid**
- **Propagates it to**
  - **any BU in Any MEU**
    - **Plug Out MEU Trax**
  - **a AAASeed internal MIDI Controller**

MEU Trax Plug 101

- To plug In or Out to a BU (in any MEU)
  - 1/ you need to choose your UI element
    - Plug In Top Left
    - Plug Out top Right
      - 3 elements for each tab
        - 9 possibles Plug Out
  - 2/ push the Plug Button
    - which became bright Green
  - 3/ push any BU from a MEU
    - including MU slider
    - the interface show where it is Plugged
      - Meu name, Bu Name and values index (some BU have several values)
    - these field can also be directly edited
  - 4/ Activate the element
  - 5/ Set the Range Out
    - to remap the Trax value [0,1] interval
    - Inv button just inverse the Remap
- To unplug
  - plug to another BU will implicitly unplug
  - use the X button on the left
- BU plug to an active trax bear a flashing green triangle
  - Top Left for Bu Destination (Trax Out)
  - Bottom right for BU Source (TRAX In)

MEU TRAX Ui

- Select the input or internal Generators



- Process The Signal
  - GB Gain Bias (see slide for Meu Video)
  - Threshold
    - Mode Flip On Up useful to transform push button in switch
  - Remap
  - Filter going Up andor Down

- Display the signal
  - Cyan input signal
  - Yellow processed signal
- Control Signal display