

A Case Study of Legacy Source Code

The Computer Music System TAU₂-TAU_{mus}

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interesting?

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- Developed in Pisa: fits well the SWHAP@Pisa project

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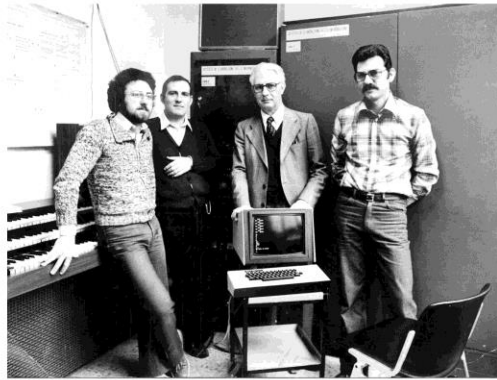
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- Dedicated (and still existing) hardware

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- Developed in Pisa: fits well the SWHAP@Pisa project
- Dedicated (and still existing) hardware
- A pioneeristic work
- Tons of related material (thanks to Leonello Tarabella)



An overview of Grossi's work

- Born in 1917 in Venice
- 1965: professor for the first electronic music course in Italy
- 1967: starts exploring computer music (first Olivetti, then CNUCE)
- 1970: first experiment on musical telematics
- 1975: deployment of TAU₂/TAU_{mus} system
- 1985: introduces the concept of Home Art

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- 1967: starts exploring computer music (first Olivetti, then CNUCE)
- 1970: first experiment on musical telematics
- 1975: deployment of TAU2/TAUmus system
- 1985: introduces the concept of Home Art
- More info: <https://www.pietrogrossi.org>

Home art nowadays



Tarabella's fonds of TAUmus

- Three main categories:

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 - Papers and sketches

5) Al create e le sue opzioni

- Criteri generali (e vincoli applicabili alle opzioni: range di frequenze e durata, intervallo minimo..., la creazione dei vari reperti elaborati).

- Ripetizione (+ titolo) e realizzazione di un brano

- L'idea: con la massima dei comandi o delle opzioni: #####/#####

è costituito a 4 reperti A, B, C, D : le opzioni:

A) LA1|20|VA|13|TA|0,0,0,0,0,0|DA1|,,20,20|FA1|,,100,120,,6|

B) LA1B1C1|20|TA|3,3,0,0,0,0|VA|10|TB|2,0,0,0,0,0|VB|10|
TC|2,6,5,0,0,2,3|VC|10|
DA1|,,40,40|FA1|,,55,130,,12|
DB1|,,40,60,,20|FB1|,,163,190,,6|
DC1|,,60,80,,13|FC1|,,175,200,,3|

C) LA120,2C12|20|TA|3,5,6,0,0,0,0|VA|12|TB|2,0,5,0,2,3,6|VB|12|
TC|2,5,4,1,2,0,3|VC|12|
DA12|,,40,40|FA12|,,55,130,,12|FA12|,,16,1|
DB12|,,40,40|FB12|,,163,190,,6|PB12|,,13,7|
DC12|,,40,40|FC12|,,140,215|PC12|,,90,,|

D) LA123B123C123|20|

A: una voce - durate uguali - veloce (20 secondi) TON.

B: Tre voci - 3 diverse durate, compati tutti, tecnica più variata (20 secondi) VOC.

C: tre voci - 3 durate uguali, trinitone, e molte forme (20 sec.) MIX.

D: nove voci - tutto canale PERF.

GRUPPE

Tarabella's fonds of TAUmus

- Three main categories:
 - Papers and sketches
 - Source code

Load BOURREE

PLAY

Goback

PLAY

Invert

PLAY

Invert

Modify F|+21

Chain BOURREE

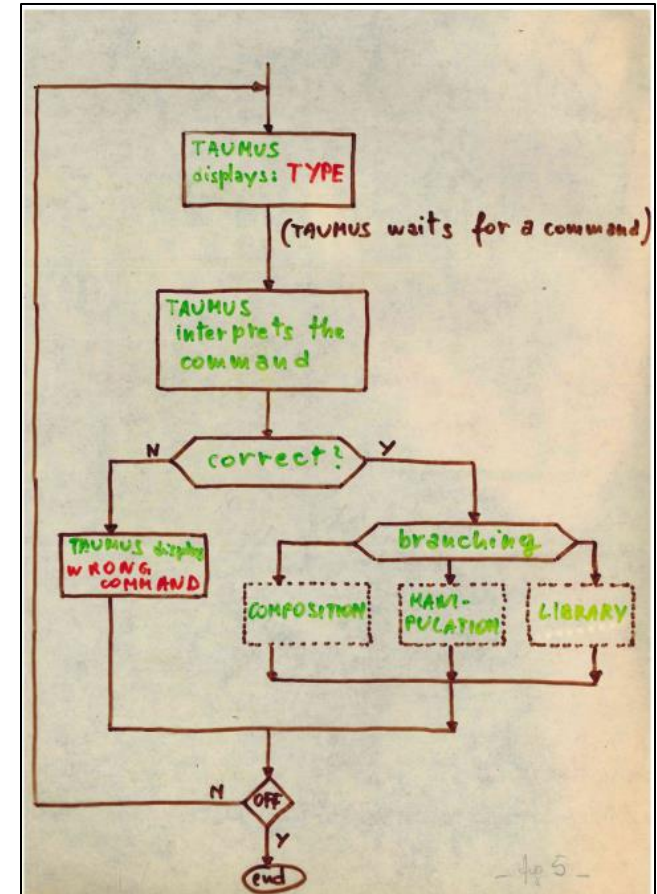
Mix 13,,, 3

PLAY

Save BOUR1

Tarabella's fonds of TAUmus

- Three main categories:
 - Papers and sketches
 - Source code
 - Project specifications



Different kinds of Source Code

Different kinds of Source Code

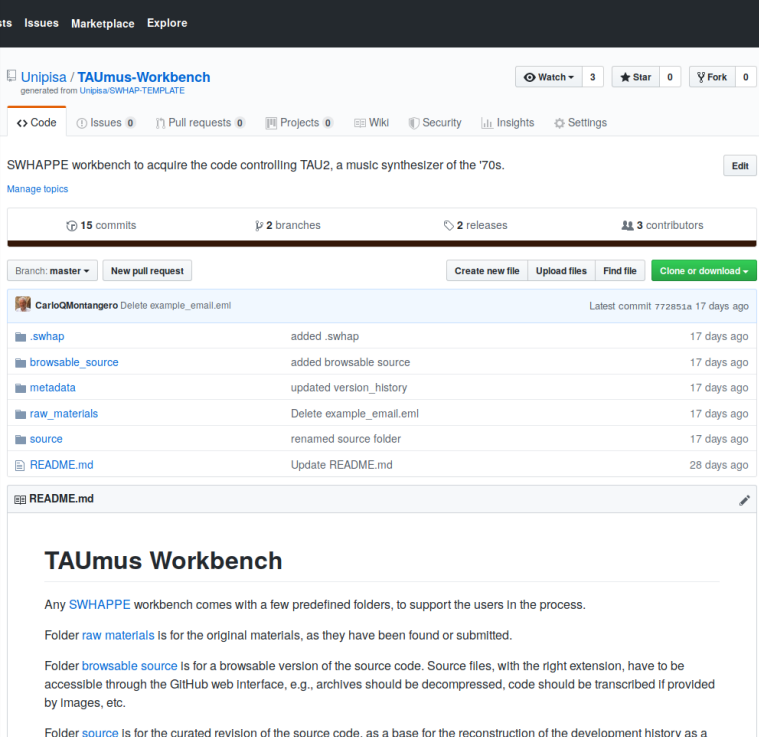
- FORTRAN listings:
 - TAU2 was just an audio terminal: it didn't run code
 - Code ran on the CNUCE's IBM 370
 - These are (part of) the code of the TAUmus interpreter

Different kinds of Source Code

- FORTRAN listings:
 - TAU2 was just an audio terminal: it didn't run code
 - Code ran on the CNUCE's IBM 370
 - These are (part of) the code of the TAUmus interpreter
- TAUmus listings:
 - Hand-written, the actual code of music sessions
 - The interpreter was basically a terminal
 - The user could play music using the TAUmus commands

The process, instantiated

- TAUmus Workbench is the (virtual) place where the work actually started



its Issues Marketplace Explore

Unipisa / TAUmus-Workbench
generated from Unipisa/SWHAP-TEMPLATE

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SWHAPPE workbench to acquire the code controlling TAU2, a music synthesizer of the '70s. Edit

Manage topics

15 commits 2 branches 2 releases 3 contributors

Branch: master New pull request Create new file Upload files Find file Clone or download

File	Change	Time
.swhap	added .swhap	17 days ago
browsable_source	added browsable source	17 days ago
metadata	updated version_history	17 days ago
raw_materials	Delete example_email.eml	17 days ago
source	renamed source folder	17 days ago
README.md	Update README.md	28 days ago

TAUmus Workbench

Any SWHAPPE workbench comes with a few predefined folders, to support the users in the process.

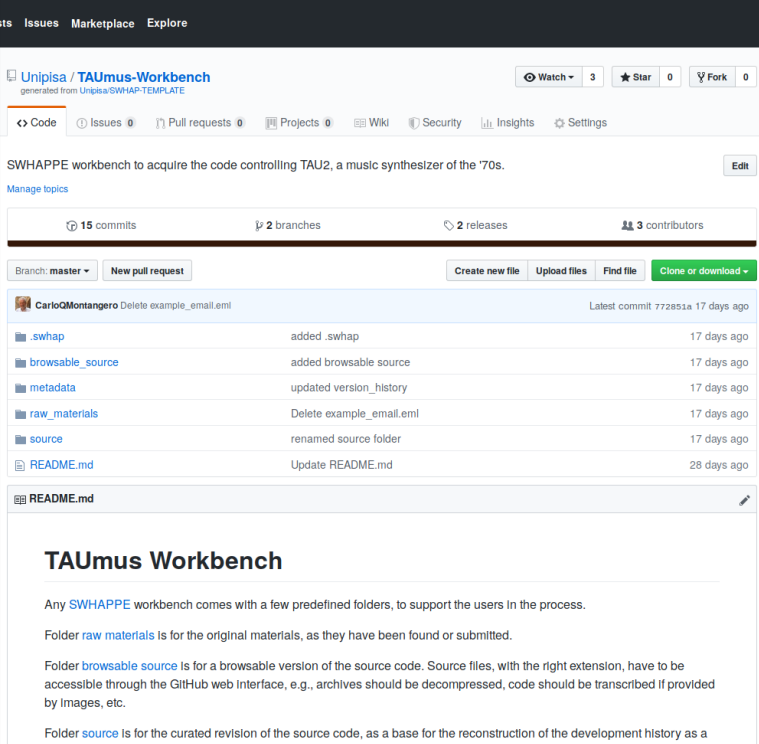
Folder [raw materials](#) is for the original materials, as they have been found or submitted.

Folder [browsable source](#) is for a browsable version of the source code. Source files, with the right extension, have to be accessible through the GitHub web interface, e.g., archives should be decompressed, code should be transcribed if provided by images, etc.

Folder [source](#) is for the curated revision of the source code, as a base for the reconstruction of the development history as a

The process, instantiated

- TAUmus Workbench is the (virtual) place where the work actually started
- The directory structure is inherited from the SWHAP template



The screenshot shows the GitHub interface for the repository 'Unipisa / TAUmus-Workbench'. The repository is described as 'SWHAPPE workbench to acquire the code controlling TAU2, a music synthesizer of the '70s.' It has 15 commits, 2 branches, 2 releases, and 3 contributors. The commit history shows a series of changes to folders like '.swhap', 'browsable_source', 'metadata', 'raw_materials', and 'source', along with updates to 'README.md'. The README file is open, showing the title 'TAUmus Workbench' and introductory text about the workbench's structure and folders.

Unipisa / TAUmus-Workbench
generated from Unipisa/SWHAP-TEMPLATE

SWHAPPE workbench to acquire the code controlling TAU2, a music synthesizer of the '70s.

Manage topics

15 commits 2 branches 2 releases 3 contributors

Branch: master New pull request Create new file Upload files Find file Clone or download

Commit	Message	Time
CarloMontangero	Delete example_email.eml	Latest commit 772851a 17 days ago
	added .swhap	17 days ago
	added browsable_source	17 days ago
	updated version_history	17 days ago
	Delete example_email.eml	17 days ago
	renamed source folder	17 days ago
	Update README.md	28 days ago

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Any SWHAPPE workbench comes with a few predefined folders, to support the users in the process.

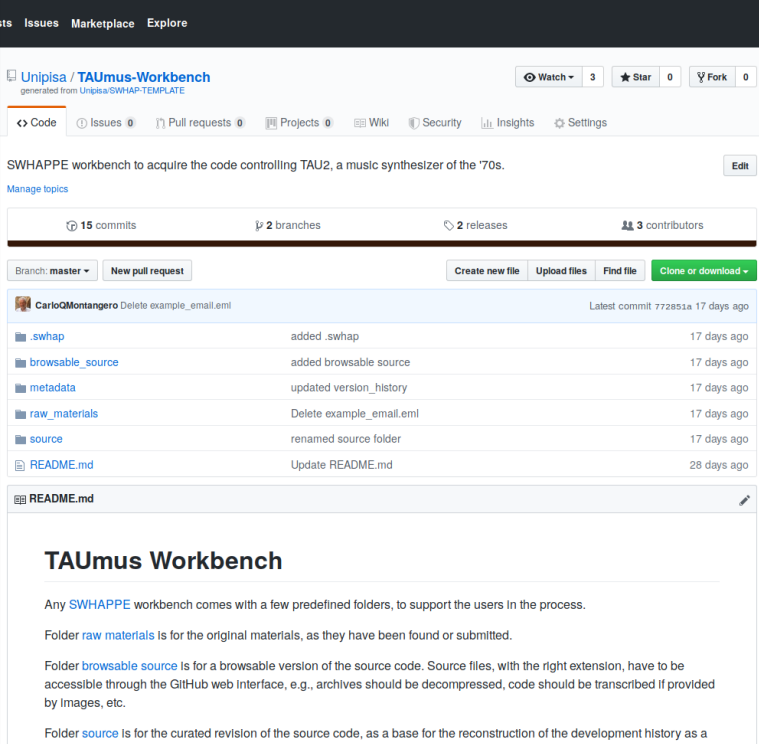
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The process, instantiated

- TAUmus Workbench is the (virtual) place where the work actually started
- The directory structure is inherited from the SWHAP template
- From here, we performed the process's steps



The screenshot shows the GitHub interface for the repository 'Unipisa / TAUmus-Workbench'. The repository is described as 'SWHAPPE workbench to acquire the code controlling TAU2, a music synthesizer of the '70s.' It has 15 commits, 2 branches, 2 releases, and 3 contributors. The commit history shows several recent changes, including the addition of folders like '.swhap', 'browsable_source', 'metadata', 'raw_materials', and 'source', and updates to 'README.md'. The 'README.md' file is expanded, showing the title 'TAUmus Workbench' and introductory text: 'Any SWHAPPE workbench comes with a few predefined folders, to support the users in the process. Folder raw materials is for the original materials, as they have been found or submitted. Folder browsable source is for a browsable version of the source code. Source files, with the right extension, have to be accessible through the GitHub web interface, e.g., archives should be decompressed, code should be transcribed if provided by images, etc. Folder source is for the curated revision of the source code, as a base for the reconstruction of the development history as a'.

The process, instantiated

- First we created the Depository

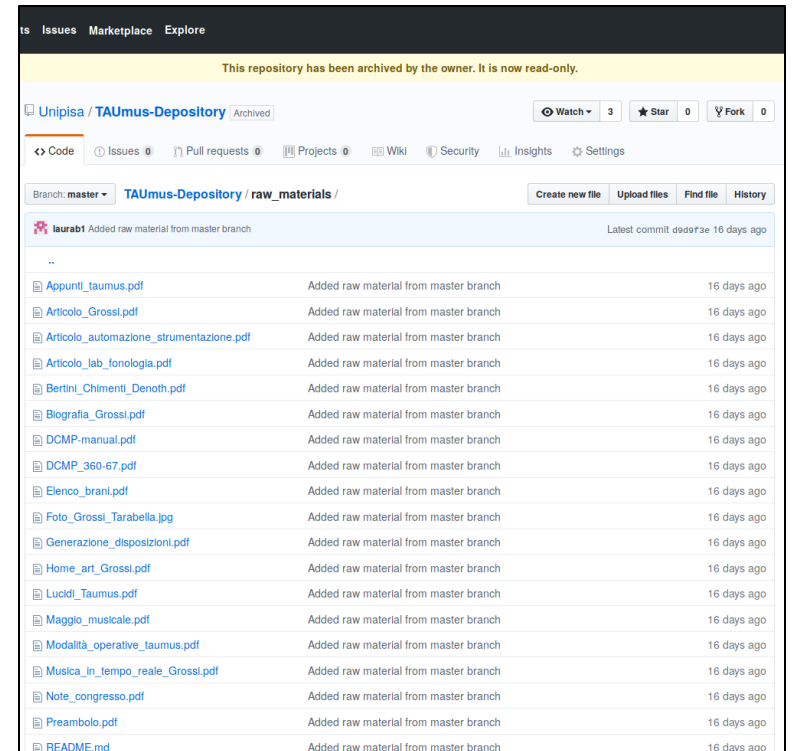
The screenshot shows a GitHub repository page for 'Unipisa / TAUmus-Depository'. At the top, a yellow banner states 'This repository has been archived by the owner. It is now read-only.' Below this, the repository name 'Unipisa / TAUmus-Depository' is displayed with 'Archived' status. The page includes navigation links for Code, Issues (0), Pull requests (0), Projects (0), Wiki, Security, Insights, and Settings. A description reads: 'SWHAPPE Depository for the code controlling TAU2, a music synthesizer of the 70's.' Below the description are links for 'software-heritage', 'swhappe', and 'depository'. Statistics show 2 commits, 1 branch, 0 releases, and 1 contributor. The 'Branch: master' dropdown is visible. A commit history table shows the following entries:

Commit	Message	Time
laurab1	Update README.md	Latest commit 361b5cd 16 days ago
	.swhap	Added raw material from master branch 16 days ago
	browsable_source	Added raw material from master branch 16 days ago
	raw_materials	Added raw material from master branch 16 days ago
	README.md	Update README.md 16 days ago

The README.md content is displayed below, titled 'TAUmus Depository'. It states: 'This is the depository for the acquisition of TAUmus, a software controlling TAU2, a music synthesizer of the '70s.' It also mentions that the repository contains raw materials and browsable source, and provides links to the Workbench and TAUmus repository for more information.

The process, instantiated

- First we created the Depository
 - Here we have raw-material...

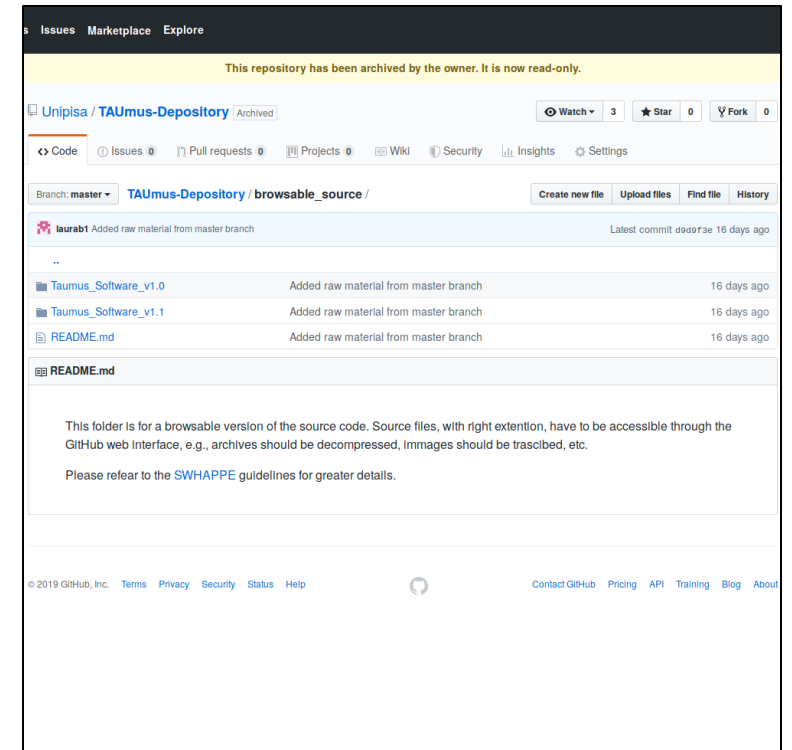


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File Name	Description	Commit Time
..		
Appunti_taumus.pdf	Added raw material from master branch	16 days ago
Articolo_Grossi.pdf	Added raw material from master branch	16 days ago
Articolo_automazione_strumentazione.pdf	Added raw material from master branch	16 days ago
Articolo_lab_fonologia.pdf	Added raw material from master branch	16 days ago
Bertini_Chimenti_Denoth.pdf	Added raw material from master branch	16 days ago
Biografia_Grossi.pdf	Added raw material from master branch	16 days ago
DCMP-manual.pdf	Added raw material from master branch	16 days ago
DCMP_360-67.pdf	Added raw material from master branch	16 days ago
Elenco_branzi.pdf	Added raw material from master branch	16 days ago
Foto_Grossi_Tarabella.jpg	Added raw material from master branch	16 days ago
Generazione_disposizioni.pdf	Added raw material from master branch	16 days ago
Home_art_Grossi.pdf	Added raw material from master branch	16 days ago
Lucki_Taumus.pdf	Added raw material from master branch	16 days ago
Maggio_musicale.pdf	Added raw material from master branch	16 days ago
Modalità_operative_taumus.pdf	Added raw material from master branch	16 days ago
Musica_in_tempo_reale_Grossi.pdf	Added raw material from master branch	16 days ago
Note_congresso.pdf	Added raw material from master branch	16 days ago
Preambolo.pdf	Added raw material from master branch	16 days ago
README.md	Added raw material from master branch	16 days ago

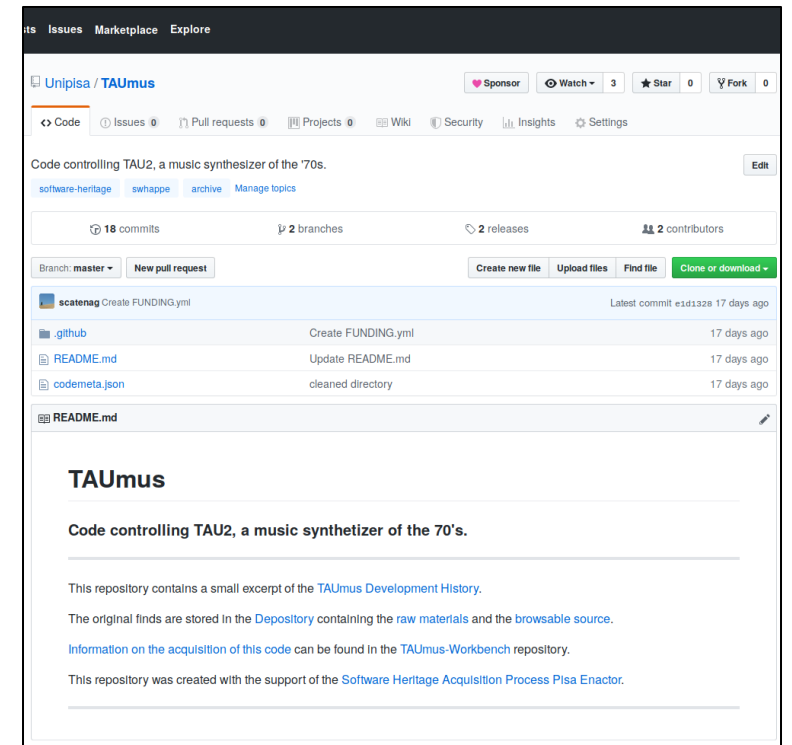
The process, instantiated

- First we created the Depository
 - Here we have raw-material...
 - ...and browsable-source



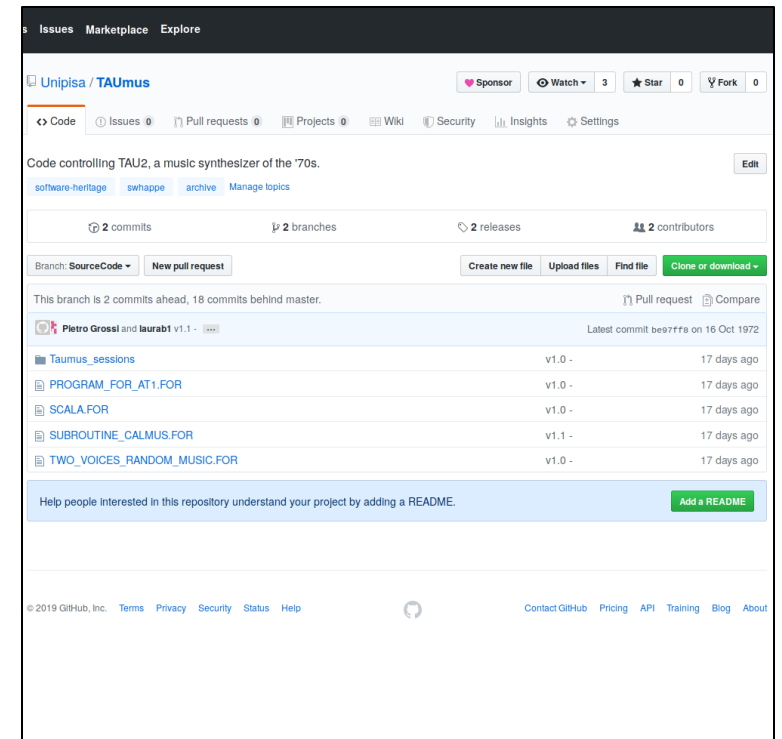
The process, instantiated

- First we created the Depository
 - Here we have raw-material...
 - ...and browsable-source
- Then we (re)created the development history



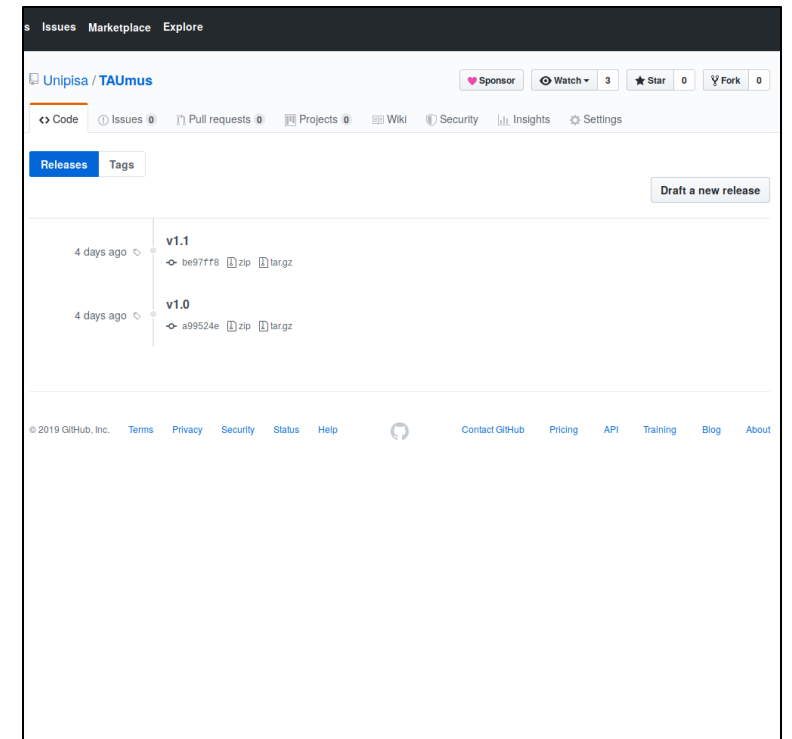
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 - The SourceCode branch contains the versioned code

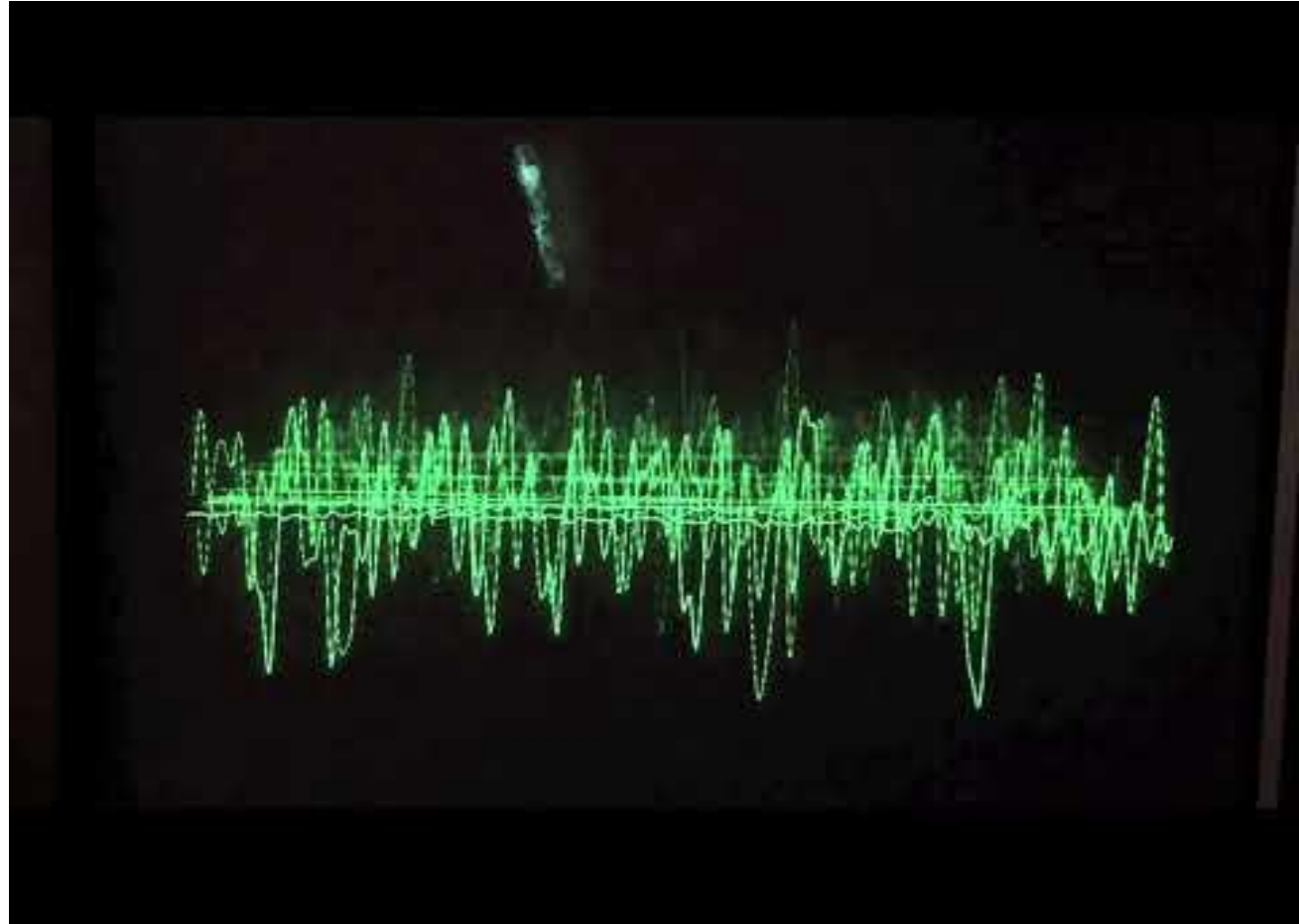


The process, instantiated

- First we created the Depository
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 - ...and browsable-source
- Then we (re)created the development history
 - The SourceCode branch contains the versioned code
 - The development history can be seen by checking for releases

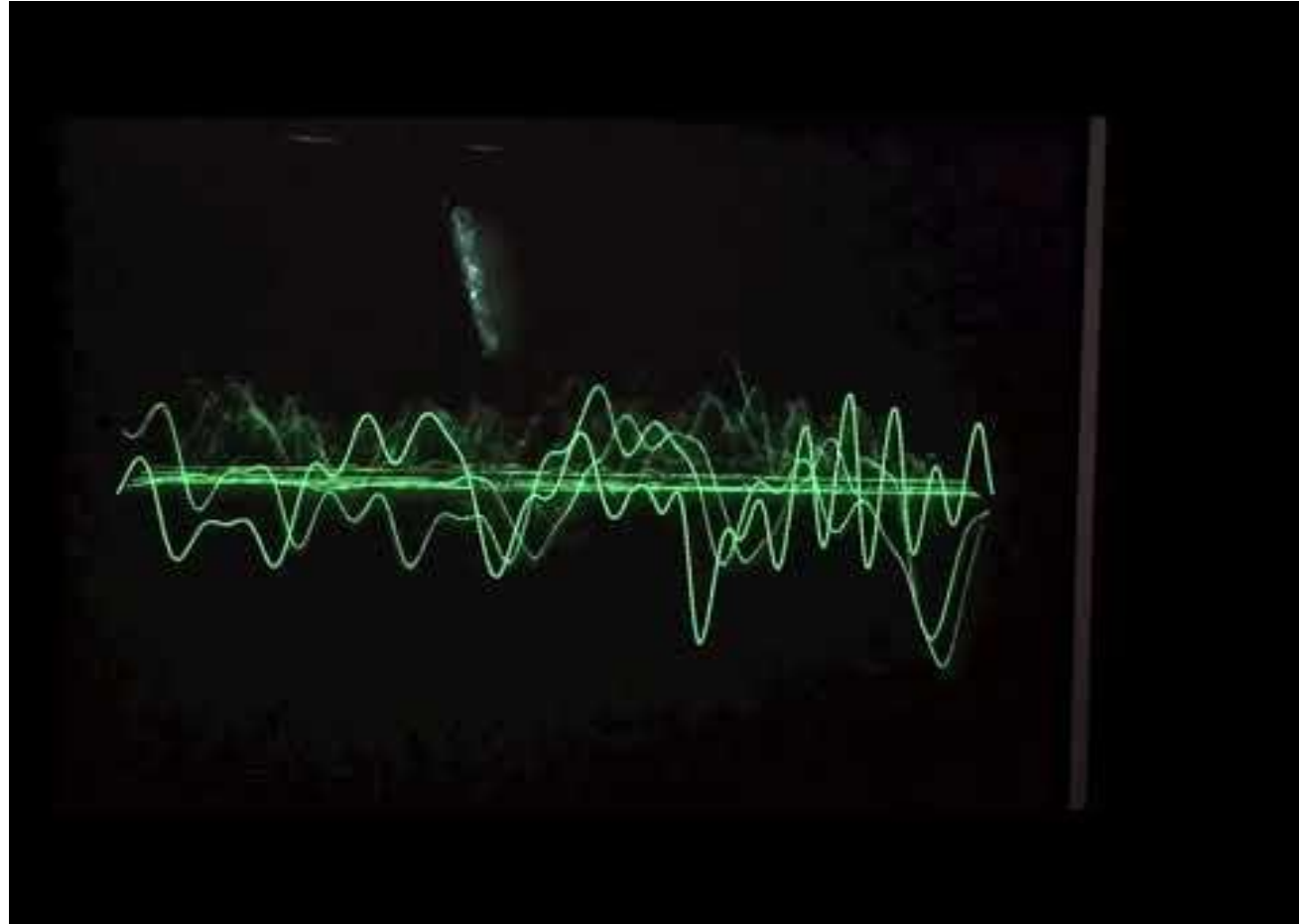


TAUmus lives
back!



Thanks to Massimo Magrini, Signal and Image Laboratory, CNR

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What we achieved

- An important piece of source code has been recovered
- A working sample of the music produced using TAUmus software is now available for everybody
- TAUmus authors and contributors work is recognized and preserved on GitHub and the Software Heritage archive
- Present phase of the process has been partially implemented

What's next

- TAUmus provides an important starting point for further discussions
 - What about "holes"?
 - Does it make sense to deploy a full functioning TAUmus clone on a modern computer?
 - Isn't source code like music, in the end?



Thank you!