LiaScript - Interactive Markdown for Education & Documentation

This presentation illustrates the vision of *Open Educational Ressources* and its application on LiaScript. The document was used during a session of WeAreDevelopers in Berlin on 14th June 2022.

The sources of the presentation can be found at Link zu finden.

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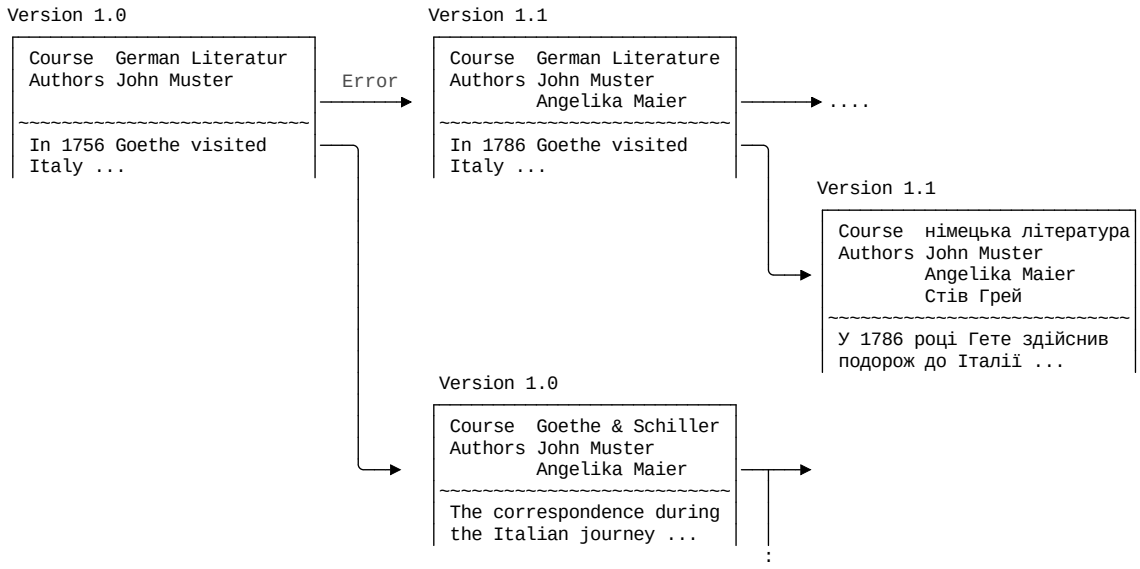
Motivation

Question: Who already has experience in teaching (in school or university) OR writes tutorials for software?

Question: What was your hope before spending hours sifting through material, organizing and animating?

Developing learning content with other contributors



Versions of the freely available teaching content of a course and its reuse in other courses.

Open Educational Resources

> ***Open Courseware / Open Educational Resources ... teaching, learning and research materials in any medium, digital or otherwise,that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or 4 limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work***
>
> — UNESCO 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries (Link)

Challenges and opportunities of OER

General Misunderstanding of OER

Histogram of different data formats

Types of files labeled with "OER" on TU Bergakademie's servers

Specific problems

Requirement	Meaning	Challenges
`storing/copying`	downloading, storing and copying	closed learning management systems
`use`	use in learning context	different learning platforms
`process`	transformation	missing standards
`adapting/mixing`	extraction and combination	commercial software products, limited digital skills
`disseminate` / `version management`	(digital) publication and version handling	limited digital skills
`identify`	find relevant materials	bunches of OER data bases

Extended definition of OER according to 5V Modell described by Jöran Muuß-Merholz und Jörg Lohrer für open-educational-ressources

> **Surprise:** A simple text document containing Markdown content and some training would solve the problems.

... but what about the content?

> ... no one will give you the teaching award for static web pages!

Simulation time: 00:37.468

```
byte leds[] = {13, 12, 11, 10};

void setup() {
  Serial.begin(115200);
  Serial.print("Hello WeAreDevelopers!");
  for (byte i = 0; i < sizeof(leds); i++) {
    pinMode(leds[i], OUTPUT);
  }
}

int i = 0;
void loop() {
  digitalWrite(leds[i], HIGH);
  delay(250);
  digitalWrite(leds[i], LOW);
  i = (i + 1) % sizeof(leds);
}
```

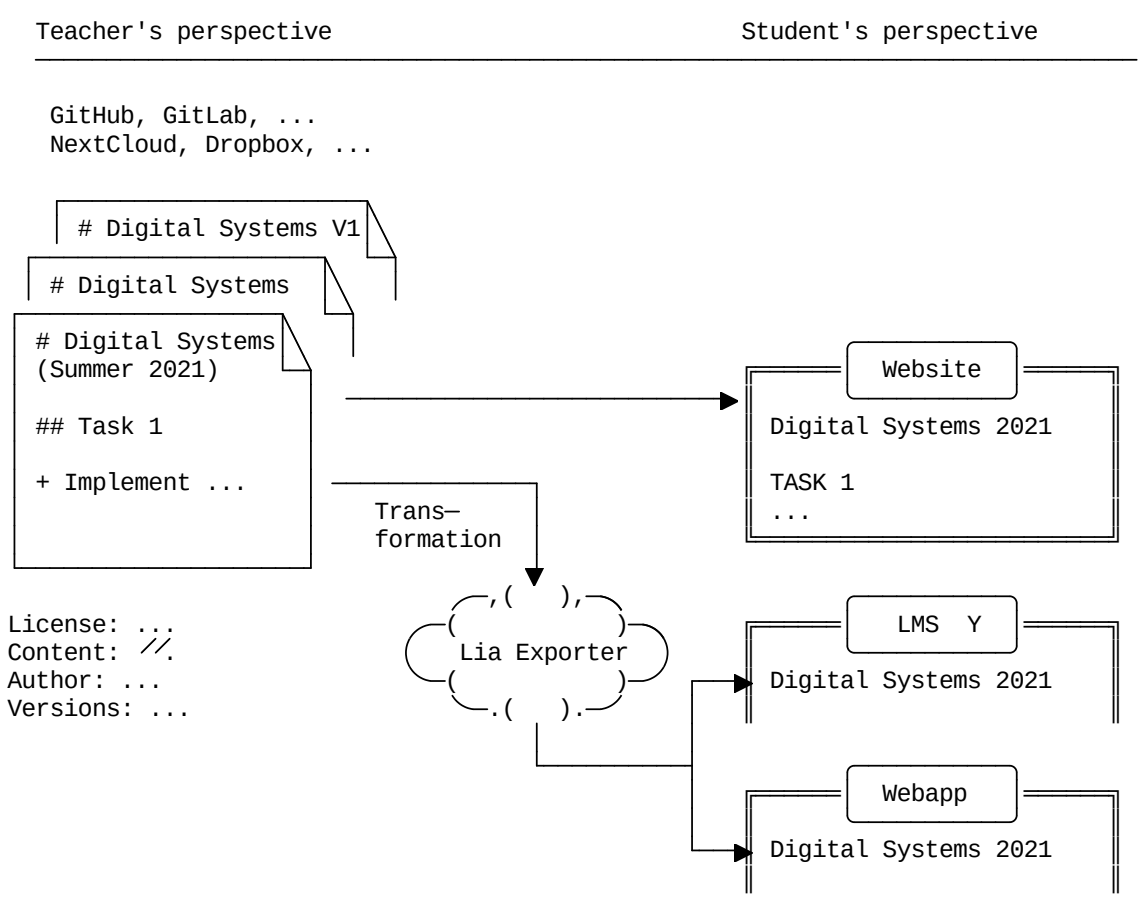
```
Sketch uses 1986 bytes (6%) of program storage space. Maximum is 32256 bytes.
Global variables use 214 bytes (10%) of dynamic memory, leaving 1834 bytes for local variables. Maximum is 2048
bytes.
```

Challenge: We have to bridge the gap between usability and interactive content.

LiaScript-Vision

```
LiaScript = free, open source,
            interactive learning materials,
            organized by a version control system,
            represented in a human readable manner,
            executed in a server-less infrastructure.                    .
```

Vision of LiaScript.



Transformation of OER materials for use in various LMSs.

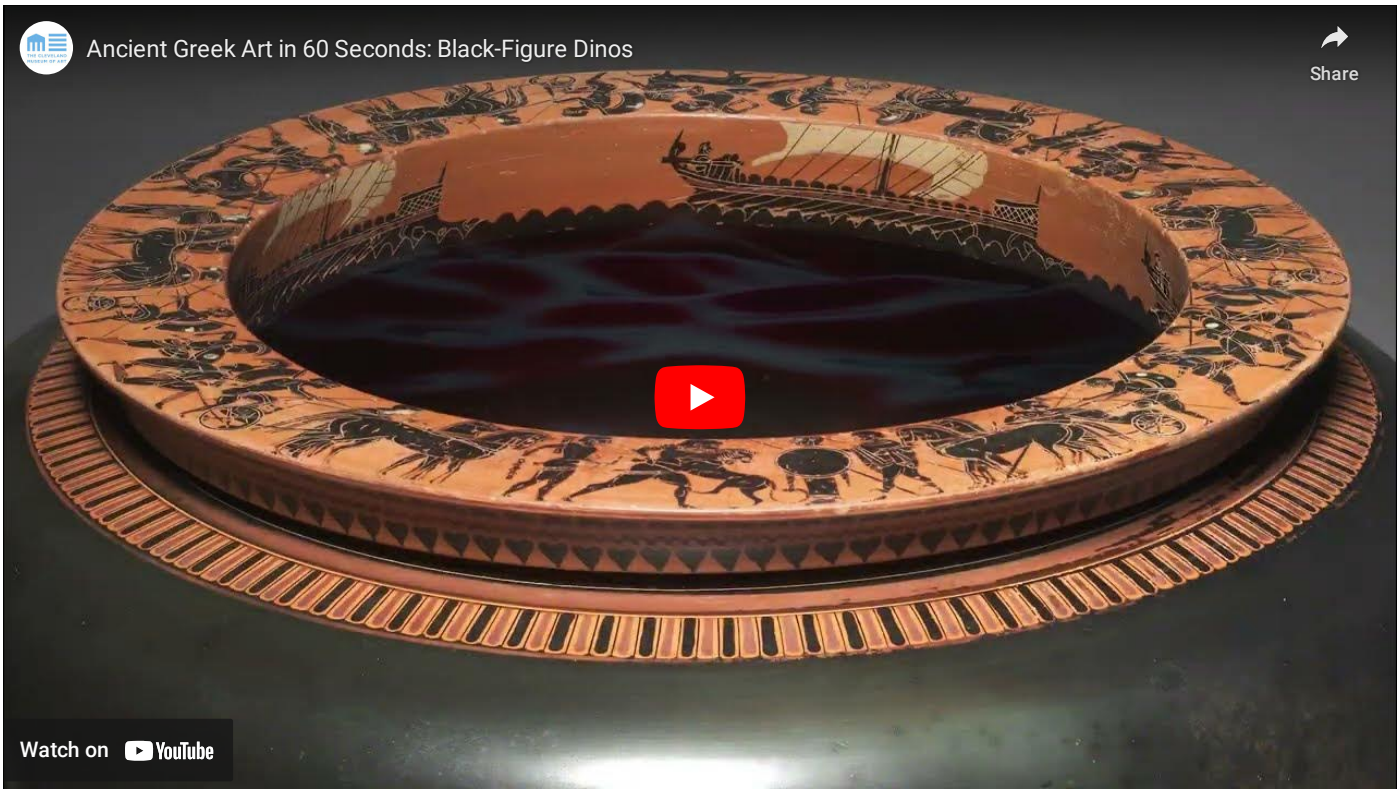
Tutorial

Extensions to Links

The so-called 'School cup' signed by the vase painter Douris. The seated man writes on a wax tablet with a stylus, showing the boy to the right how to do it. Early 5th c BCE. Berlin, Staatliche Museen.

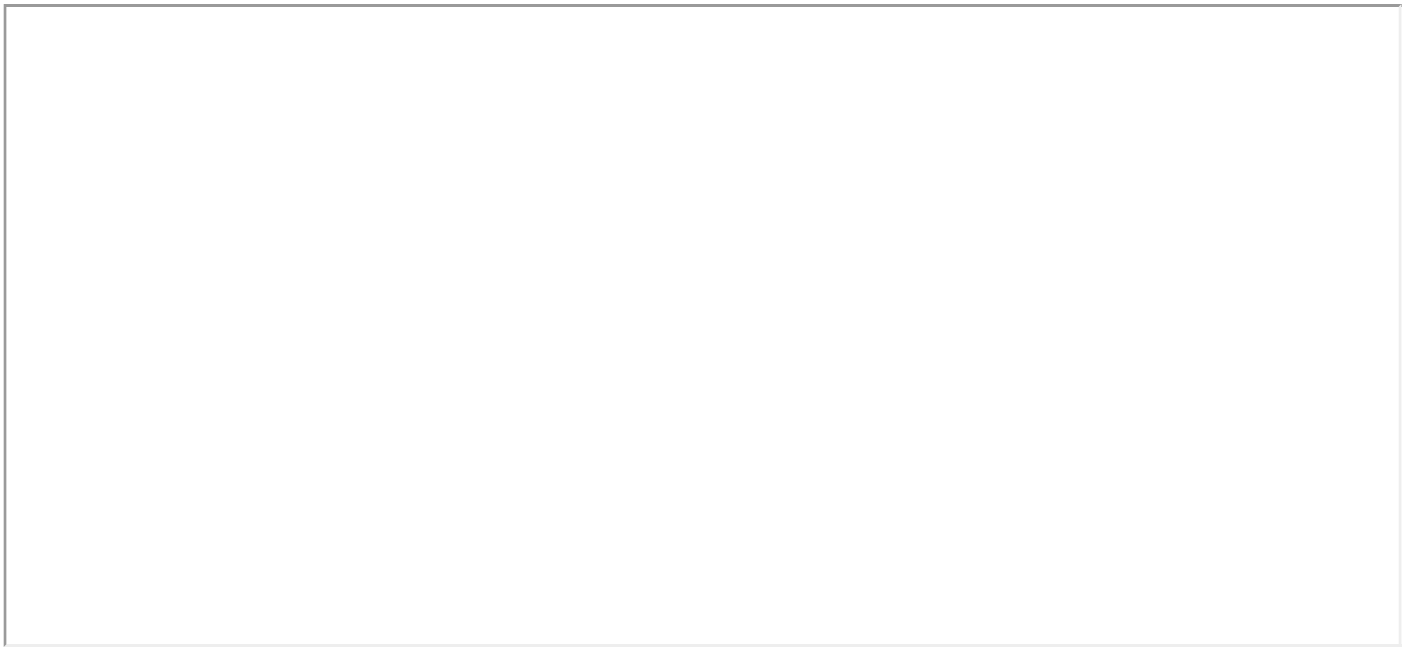
0:00 / 0:00

Ancient Greek lyrical poem by Sappho (610-580BC). Original music by IOANNIDIS



Black-Figure Dinos (Mixing Vessel); Warships (int.); Heroic Scenes (top), c. 520-515 BC. Circle of Antimenes Painter (Greek, Attic, active c. 530-510 BC). Veramic; diam. 50.8 cm; overall: 33.6 cm; rim diam. 34 cm. The Cleveland Museum of Art, Jon L. Severance Fund, 1971.46

Neck Amphora (515-510 BC). Painter of Berlin 1899 (Greek). Greece, Attic, 6th Century BC Black-figure terracotta. Diameter: 29 cm (11 7/16 in.); Overall: 39.8 cm (15 11/16 in.). Andrew R. and Martha Holden Jennings Fund 1970.16



A capacitor is a device that stores charge. As current flows into the capacitor, the voltage across the capacitor increases. As its voltage approaches the source voltage (the 5V voltage source shown on the left), the current flowing into the capacitor decreases.

Animation & Articulation

1. Animations

> Animations in LiaScript are associated with double braces `{begin-end}`.

I will	begin at
animation-step **2**	and end at step **5**.

Inline animations work *similar* 😉.

2. Articulation

Add an number in double braces to the head of a block let it appear at a certain step.

> Animations in LiaScript are associated with double braces `{begin-end}`.

I will	begin at
animation-step **2**	and end at step **3**.

Tables will be presented in more detail in the next part.

Unpack the braces and define animations within a block.

Inline animations work *similar* 😉.

«Для торжества зла достаточно бездействия хороших людей».

Tables

1. Basics

Tables	Are	Cool
col 3 is	right-aligned	$1600
col 2 is	centered	$12
zebra stripes	are neat	$1

2. Tables can be more

Animal	weight in kg	Lifespan years	Mitogen
Mouse	0.028	02	95
Flying squirrel	0.085	15	50
Brown bat	0.020	30	10
Sheep	90	12	95
Human	68	70	10

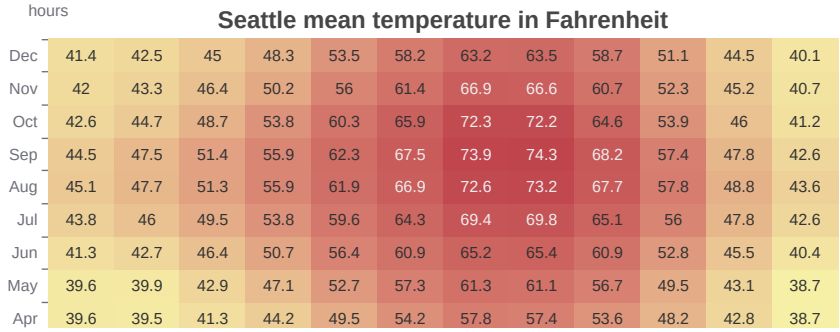
3. Smart Visualization

Music-Style 1994	Classic	Country	Reggae	Hip-Hop	Hard-Rock	Samba
Student rating	50	50	100	200	350	250

4. Combination with animations

Music-Style 1994 2014	Student rating
Classic	50 20
Country	50 30
Reggae	100
Hip-Hop	200 220
Hard-Rock	350 400
Samba	250 230

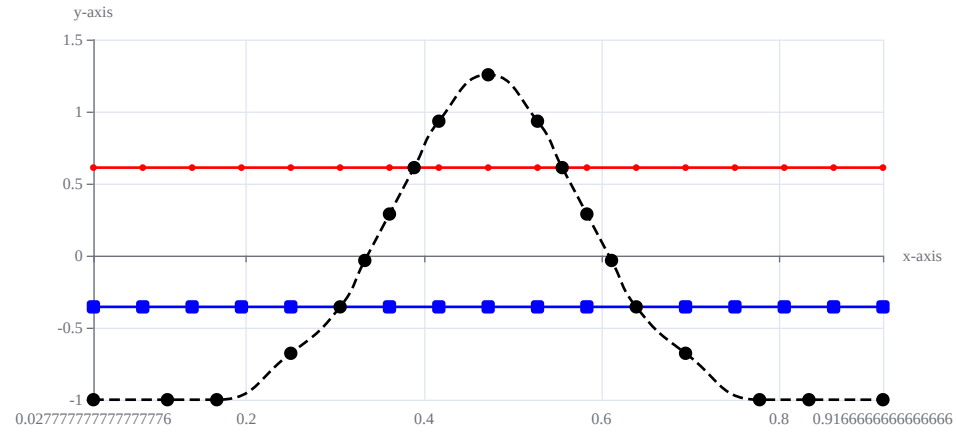
5. Customization



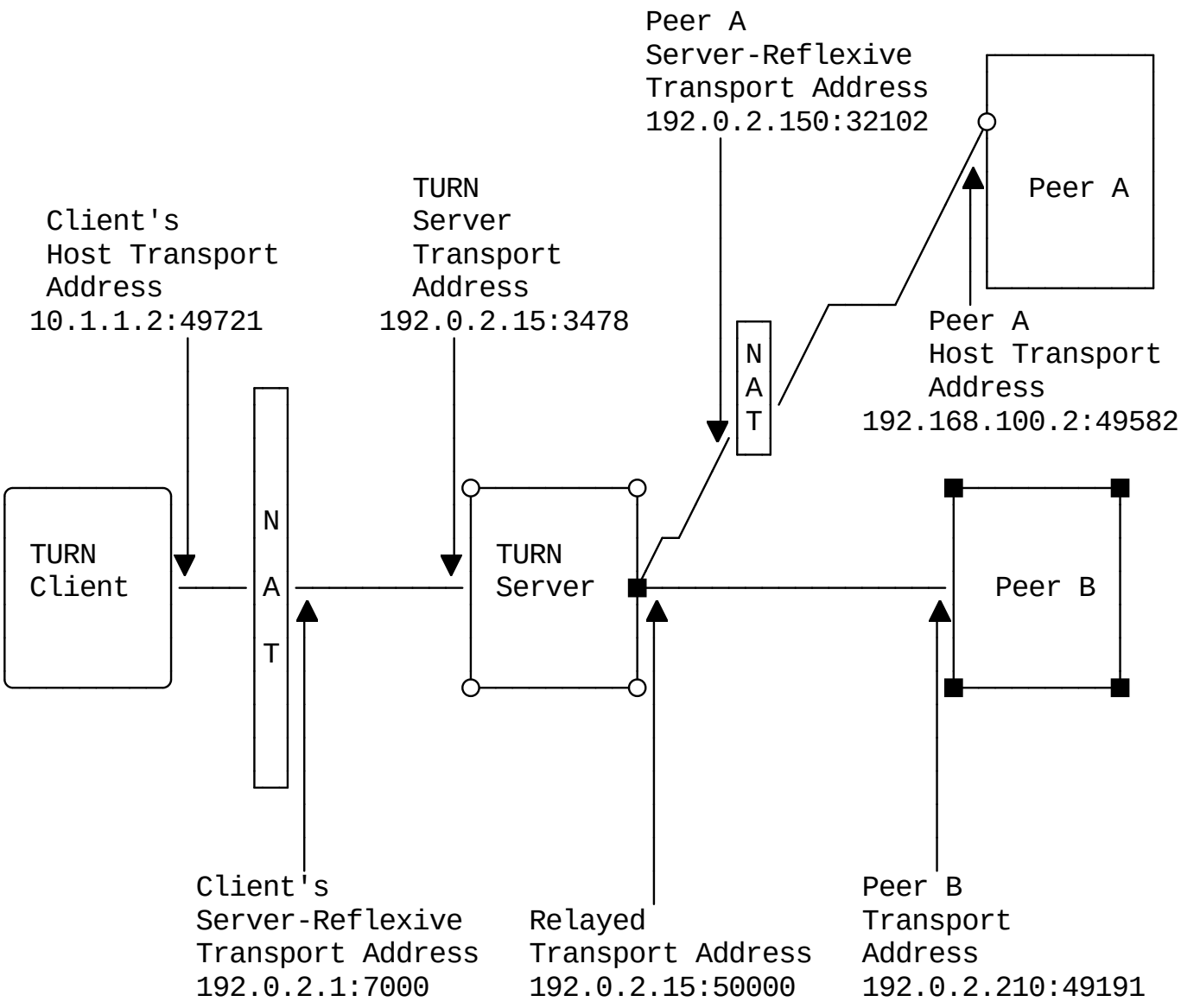
ASCII-Art

Type 1

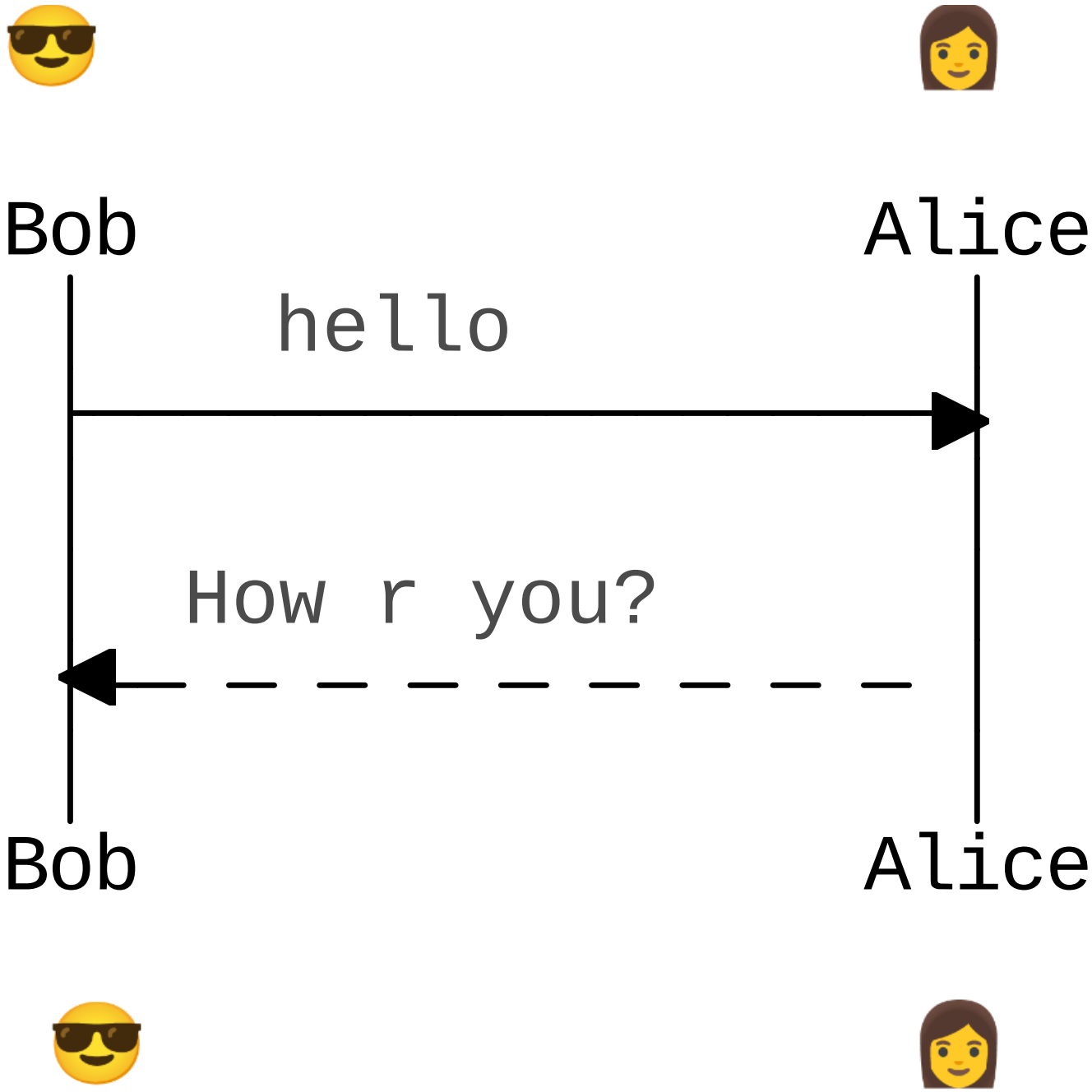
Multiline



Type 2



Type LiaScript



Tasks

- [x] Task 1
- [ ] Task 2

Quizzes

Can you define a quiz with less effort?

- [ ] Empty means not checked
- [ ] Uppercase [X] means checked ...
- [ ] ... and lowercase [x] too ...
- [ ] **as defined in the first line** ...

More Quizzes

If $I = \int (3x^2 + 125x + 64)dx$, then what is $\int_0^1 I dx$ equal to?

- ◯ $\frac{159}{2}$
- ◯ $\frac{171}{2}$
- ◯ $\frac{221}{2}$
- ◯ $\frac{225}{2}$

German is weird

Guess the correct German article for:

male (der)	female [die]	neuter (das)	
▢	▢	▢	Mann - German for man
◯	◯	◯	Frau - German for woman
▢	▢	▢	Junge - German for boy
◯	◯	◯	Mädchen - German for girl
▢	▢	▢	Paprika - German for bell pepper
◯	◯	◯	Joghurt - German for yogurt

Coding

EvalScript.js

```
let who = data.first_name + " " + data.last_name;

if(data.online) {
  who + " is online"; }
else {
  who + " is NOT online"; }
```

Data.json

```
{
  "first_name" :  "Sammy",
  "last_name"  :  "Shark",
  "online"     :  true
}
```

```
Sammy Shark is online
```

More examples at: https://github.com/topics/liascript-template

What is Coding?

Math ...

```
(3 * x - 5x)^3 * (x + x)

60!
```

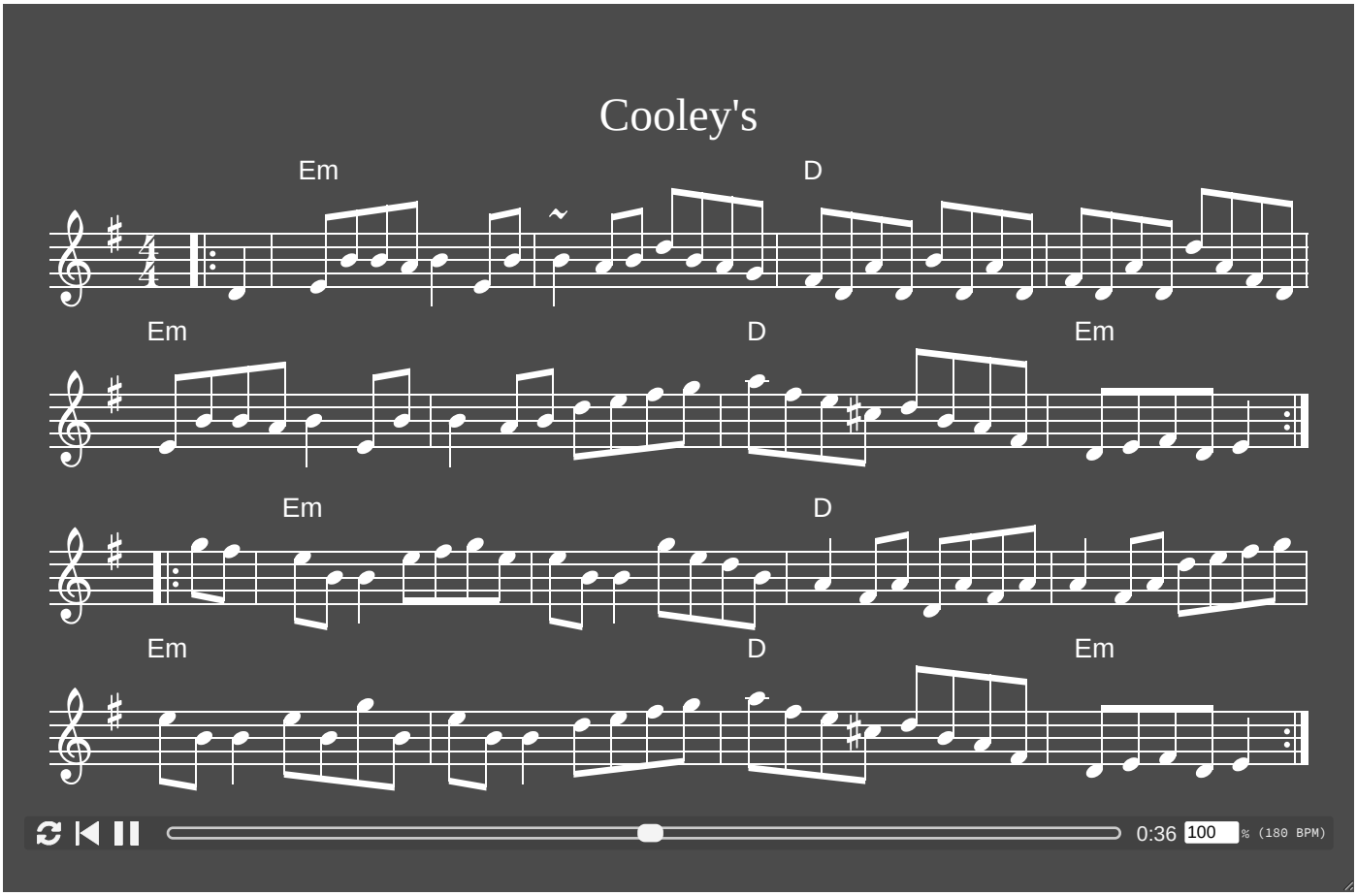
```
-16*x^4
832098711274139014427634118322336438075417260636124595244927769640960000000000000000
```

```
f=sin(t)^4-2*cos(t/2)^3*sin(t)

f=circexp(f)

defint(f,t,0,2*pi)
```

```
-16/5+3/4*pi
```

Music ...

```
% autoplay: true

X: 1
T: Cooley's
M: 4/4
L: 1/8
K: Emin
|:D2|"Em"EBBA B2 EB|~B2 AB dBAG|"D"FDAD BDAD|FDAD dAFD|
"Em"EBBA B2 EB|B2 AB defg|"D"afe^c dBAF|"Em"DEFD E2:|
|:gf|"Em"eB B2 efge|eB B2 gedB|"D"A2 FA DAFA|A2 FA defg|
"Em"eB B2 eBgB|eB B2 defg|"D"afe^c dBAF|"Em"DEFD E2:|
```



Template: https://github.com/LiaTemplates/ABCjs

Texts

Trump, Presidential Bid announcement

```
Thank you. It’s true, and these are the best and the
finest. When Mexico sends its people, they’re not sending
their best. They’re not sending you. They’re not sending
you. They’re sending people that have lots of problems, and
they’re bringing those problems with us. They’re bringing
drugs. They’re bringing crime. They’re rapists. And some,
I assume, are good people.

But I speak to border guards and they tell us what we’re
getting. And it only makes common sense. It only makes
common sense. They’re sending us not the right people.
```

Word Count: 91
Syllable Count: 118
Sentence Count: 11
Flesch Reading Ease formula: 88.43
While the maximum score is 121.22, there is no limit on how low the score can be. A negative score is valid.

Score	Difficulty
90-100	Very Easy
80-89	Easy
70-79	Fairly Easy
60-69	Standard
50-59	Fairly Difficult
30-49	Difficult
0-29	Very Confusing

Wikipedia: Flesch reading ease

Flesch-Kincaid Grade Level: 3
This is a grade formula in that a score of 9.3 means that a ninth grader would be able to read the document.
Wikipedia: Flesch-Kincaid grade level

The Fog Scale: 3.76
This is a grade formula in that a score of 9.3 means that a ninth grader would be able to read the document.

Fog Index	Reading level by grade
17	College graduate
16	College senior
15	College junior
14	College sophomore
13	College freshman
12	High school senior
11	High school junior
10	High school sophomor
9	High school freshman
8	Eighth grad
7	Seventh grade
6	Sixth grade

Wikipedia: Gunning fog index

SMOG Index: 4.9
This is a grade formula in that a score of 9.3 means that a ninth grader would be able to read the document.
Texts of fewer than 30 sentences are statistically invalid, because the SMOG formula was normed on 30-sentence samples. textstat requires atleast 3 sentences for a result.
Wikipedia: SMOG grade

Automated Readability Index: 6.3
Returns the ARI (Automated Readability Index) which outputs a number that approximates the grade level needed to comprehend the text.
For example if the ARI is 6.5, then the grade level to comprehend the text is 6th to 7th grade.

Score	Age	Grade Level
14	24+	Professor
13	18-24	College student
12	17-18	Twelfth grade
11	16-17	Eleventh Grade
10	15-16	Tenth Grade
9	14-15	Ninth Grade
8	13-14	Seventh Grade
7	12-13	Seventh Grade
6	11-12	Sixth Grade
5	10-11	Fifth Grade
4	9-10	Fourth Grade
3	7-9	Third Grade
2	6-7	First/Second Grade
1	5-6	Kindergarten

Wikipedia: Automated readability index

Coleman-Liau Index: 7.85
This is a grade formula in that a score of 9.3 means that a ninth grader would be able to read the document.
Wikipedia: Coleman-Liau index

Linsear Write Formula: 2.9
This is a grade formula in that a score of 9.3 means that a ninth grader would be able to read the document. It is a readability metric for English text, purportedly developed for the United States Air Force to help them calculate the readability of their technical manuals. It is specifically designed to calculate the United States grade level of a text sample based on sentence length and the number of words used that have three or more syllables.
Wikipedia: Linsear Write

Dale-Chall Readability Score: 5.44
Different from other tests, since it uses a lookup table of the most commonly used 3000 English words. Thus it returns the grade level using the New Dale-Chall Formula.

Score	Understood by
9.0-9.9	average 13th to 15th-grade (college) student
8.0-8.9	average 11th or 12th-grade student
7.0-7.9	average 9th or 10th-grade student
6.0-6.9	average 7th or 8th-grade student
5.0-5.9	average 5th or 6th-grade student
4.9 or lower	average 4th-grade student or lower

Wikipedia: Dale-Chall readability formula

Readability Consensus: 4th and 5th grade
Based upon "Dale-Chall Readability Score", "Linsear Write Formula", "Coleman-Liau Index", "Automated Readability Index", "SMOG Index", "Fog Scale", " Flesch-Kincaid Grade Level", "Flesch Reading Ease formula", returns the estimated school grade level required to understand the text.

Reading Time:
- Basic: 00:21 - 00:27 minutes
- Proofreading (paper/monitor): 00:27 / 00:30 minutes

The speed at which subjects read a text aloud tend varies between 228±30 words per minute for English. While proofreading materials, people are able to read English at 200 words per minute on paper, and 180 words per on a monitor.
Wikipedia: Reading and comprehension

Speaking Time:
- Presentation: 00:43 - 00:54 minutes
- Audiobook: 00:34 - 00:36 minutes

Audiobooks are recommended to be 150-160 words per minute, which is the range that people comfortably hear and vocalize words. Slide presentations tend to be closer to 100-125 words per minute for a comfortable pace.
Wikipedia: Speech and listening

Template: https://github.com/liaTemplates/TextAnalysis

How to create a LiaScript Macros

André Dietrich, Sebastian Zug

Scripting

The square of 0 is 0

A bit more complex (CO2 offsetting by trees)

It can be concluded that the annual CO2 offsetting rate varies from 21.77 kg $\frac{CO_2}{tree}$ to 31.5 kg $\frac{CO_2}{tree}$. To compensate 1 tonne of CO2, 32 to 46 trees are needed. In Europe, there are 300 to 500 trees per hectare. For calculating the figures on the Encon website, we assume a rate of 27 kg CO2/tree and an average of 400 trees per hectare. This means that 1 hectare of forest: 400 trees x 27 kg $\frac{CO_2}{tree}$ = Invalid or unexpected token of CO_2 offsets, i.e. Invalid or unexpected token tonnes $\frac{CO_2}{hectare}$.

Source: https://www.encon.be/en/calculation-co2-offsetting-trees

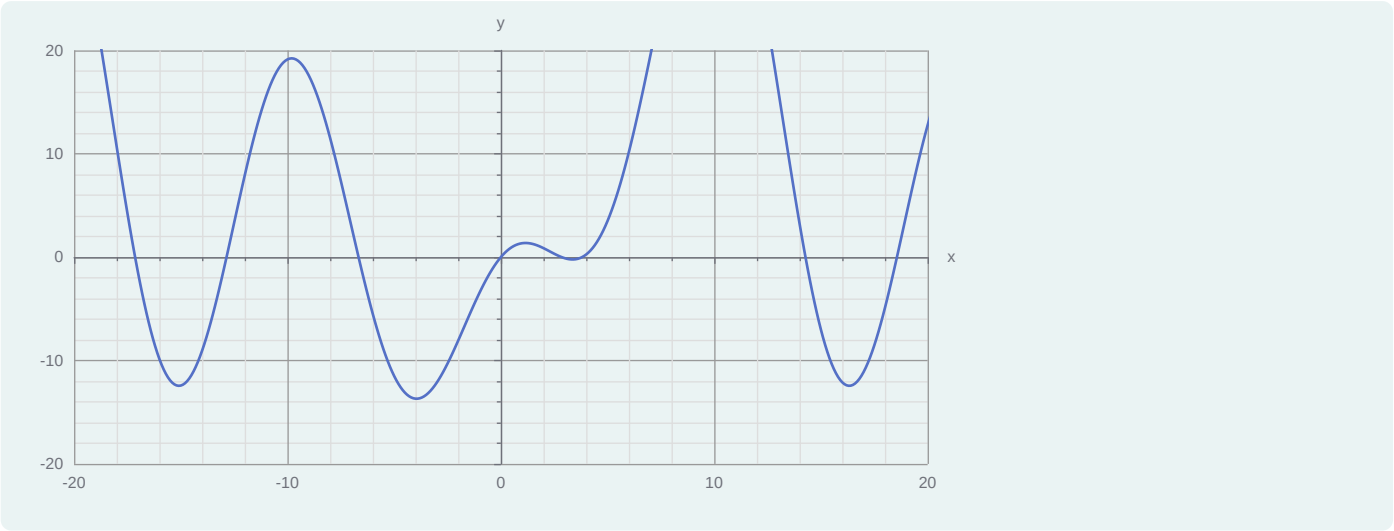
Combining scripts with Markdown

Pos: 2 and amplitude: 1

Header 1	2
1	0,14 €
2	-0,76 €
3	-0,96 €
4	-0,28 €
5	0,66 €
6	0,99 €
7	0,41 €
8	-0,54 €
9	-1,00 €

Scripts can output HTML and LiaScript too

The first value defines some kind of range: 2 , while the second can be interpreted as range 50. You can double-click on any gray element to inspect and edit its javascript code.



How do you Share your content?

Macros: https://github.com/topics/liascript-template

Courses:

`https://liascript.github.io/course/?YOUR-COURSE-URL`

https://liascript.github.io/course/?https://raw.githubusercontent.com/LiaPlayground/LiaScript_WeAreDevelopers2022/main/README.md

Questions

Did you like the presentation so far?

- ◯ no way, could not find a way out
- ◯ not that bad actually
- ◯ I don't care, was here to get faster to the lunch
- ◯ was quite convincing
- ◯ yes of course, LUA is the best 😉

Will you use LiaScript in the future?

- ◯ Definitely, I will try it out
- ◯ I am not sure at the moment
- ◯ No, I am not convinced

Which features will you use?

- ☐ The text-to-speech and animations
- ☐ The coding with the editor
- ☐ The ASCII-art feature
- ☐ Tables to visualize data
- ☐ Interactive quizzes
- ☐ The JavaScript features and macros

Additional resources

- **Project-Website:** https://LiaScript.github.io
- **Open-Source:** https://github.com/liascript
- **YouTube:** https://www.youtube.com/channel/UCyiTe2GkW_u05HSdvUblGYg
- **Additional resources:**
  - Documentation: https://github.com/LiaScript/docs
  - Free books: https://github.com/LiaBooks
  - Templates: https://github.com/topics/liascript-template
  - Courses & ...: https://github.com/topics/liascript-course
  - Blog: https://aizac.herokuapp.com
- **Editor:** https://code.visualstudio.com/Download
  - Liascript-Preview: https://marketplace.visualstudio.com/items?itemName=LiaScript.liascript-preview
  - Liascript-Snippets: https://marketplace.visualstudio.com/items?itemName=LiaScript.liascript-snippets
- **Development-Server:** https://www.npmjs.com/package/@liascript/devserver
- **Exporter:** https://www.npmjs.com/package/@liascript/exporter

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How to contact us:

- via Twitter: https://twitter.com/LiaScript
- or via chat: https://gitter.im/LiaScript/community