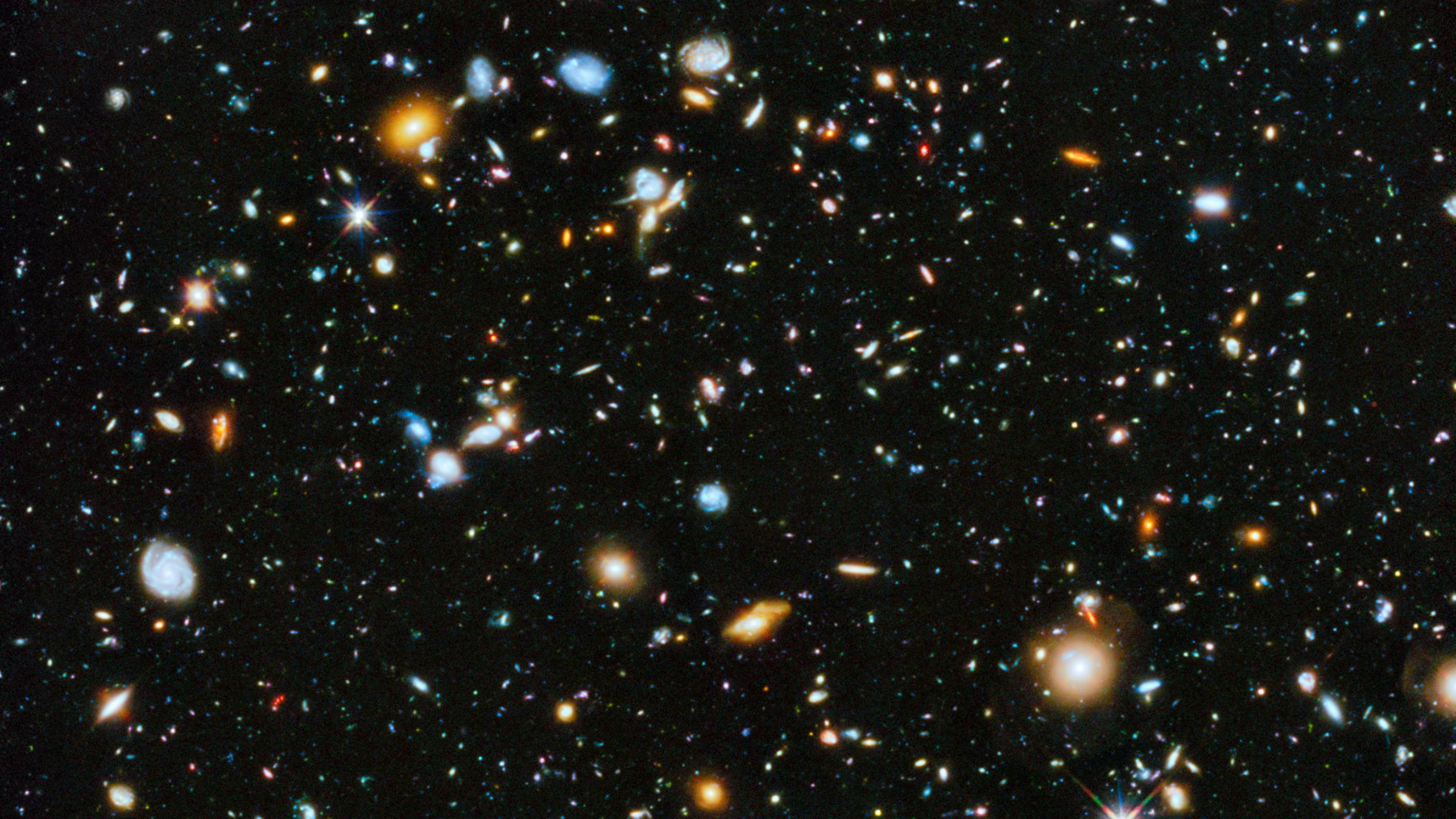
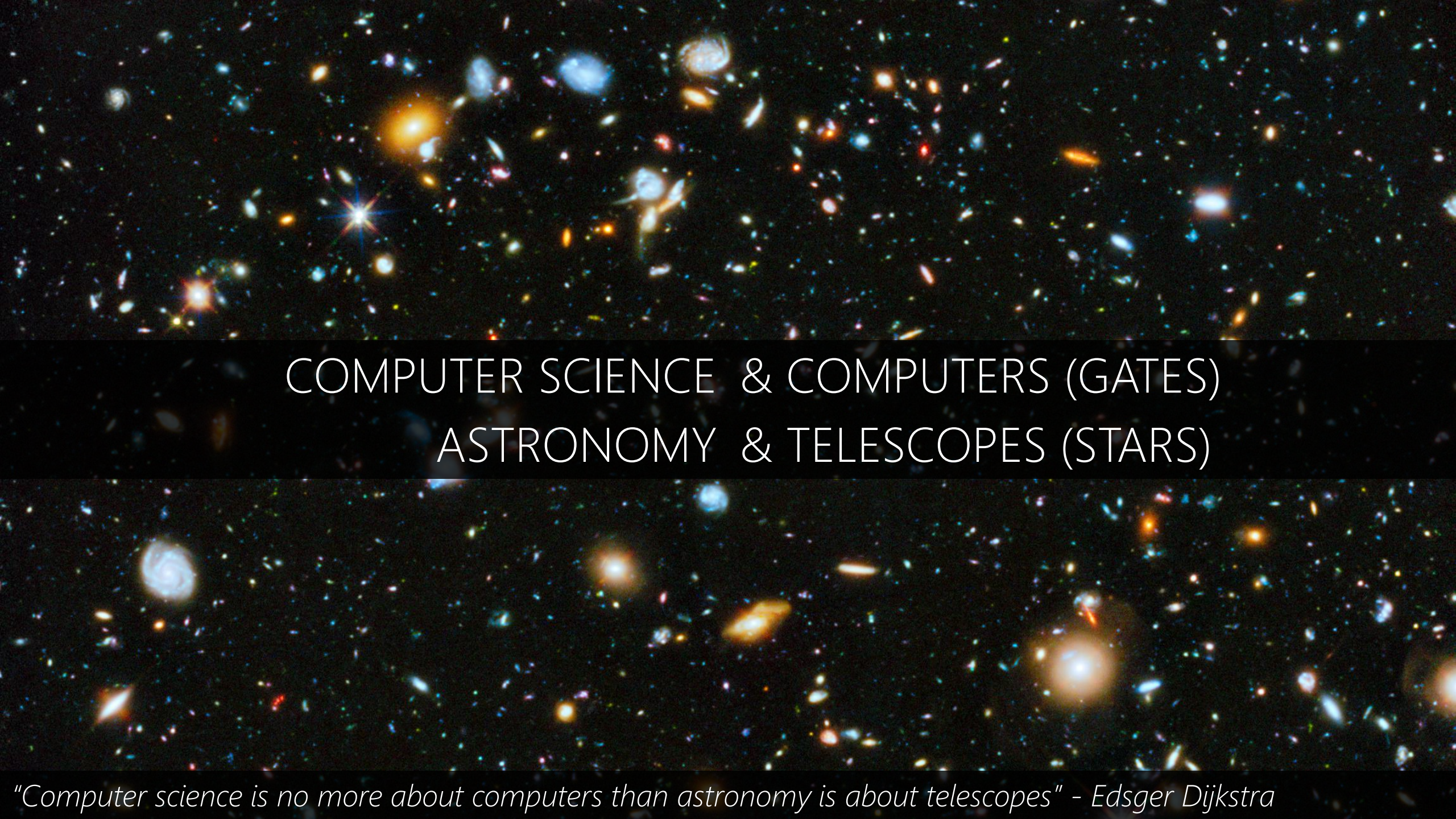
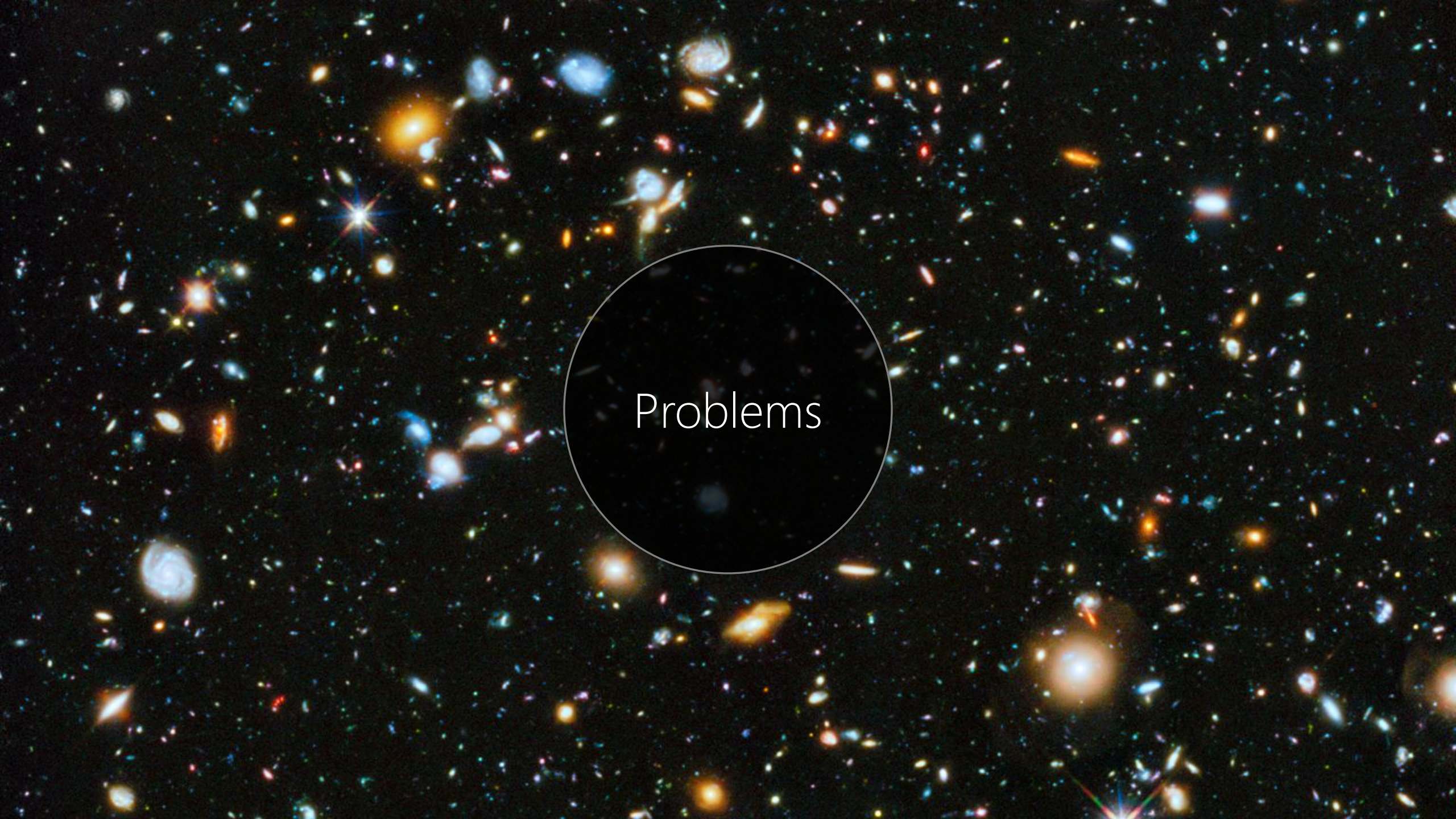


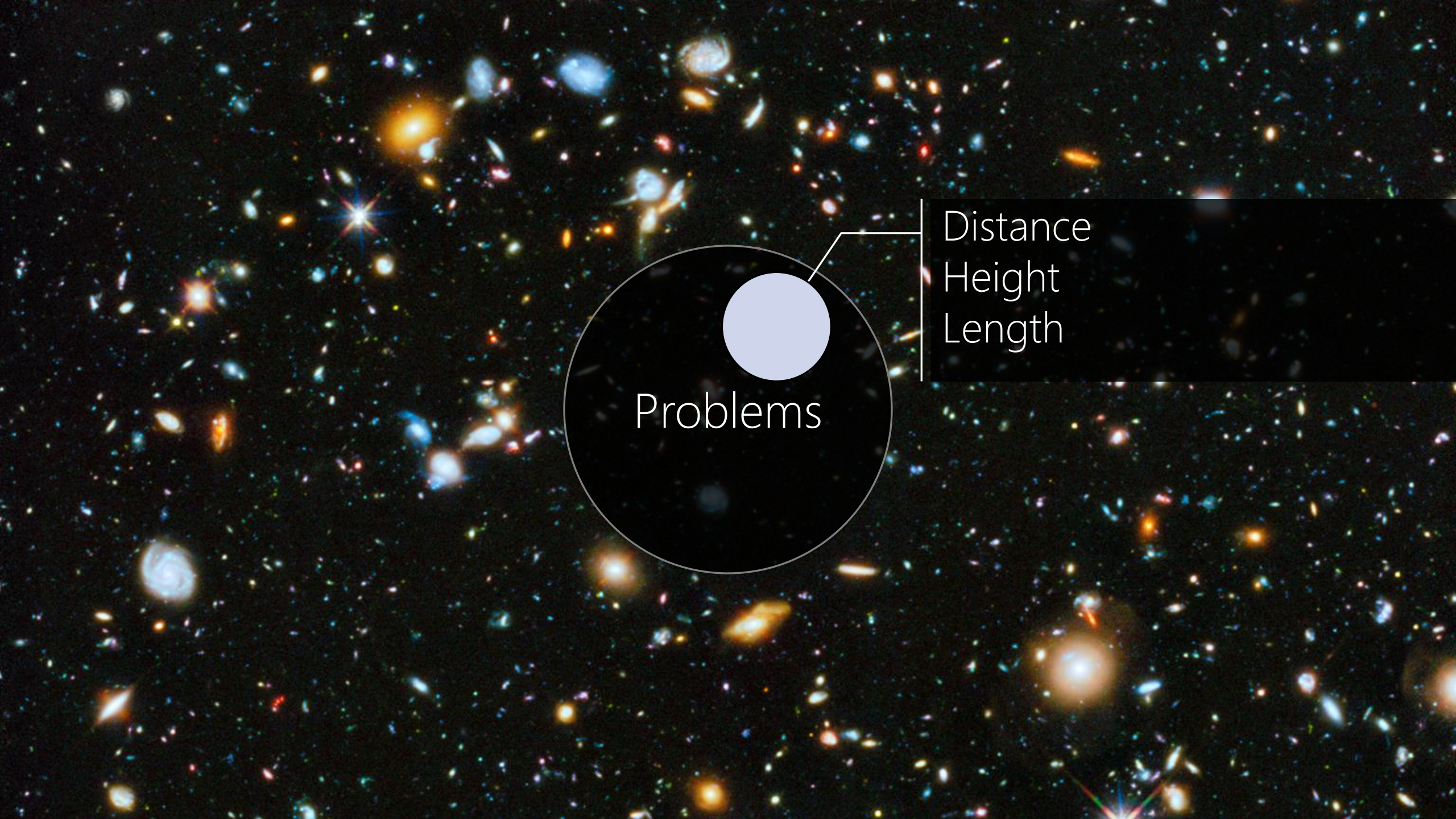

HUBBLE UNVEILS ITS MOST COLORFUL VIEW OF THE UNIVERSE
(ZOOM AND PAN)
BROWSE THE LINK BELOW AND PLAY!
https://hubblesite.org/contents/media/videos/2014/27/766-Video.html

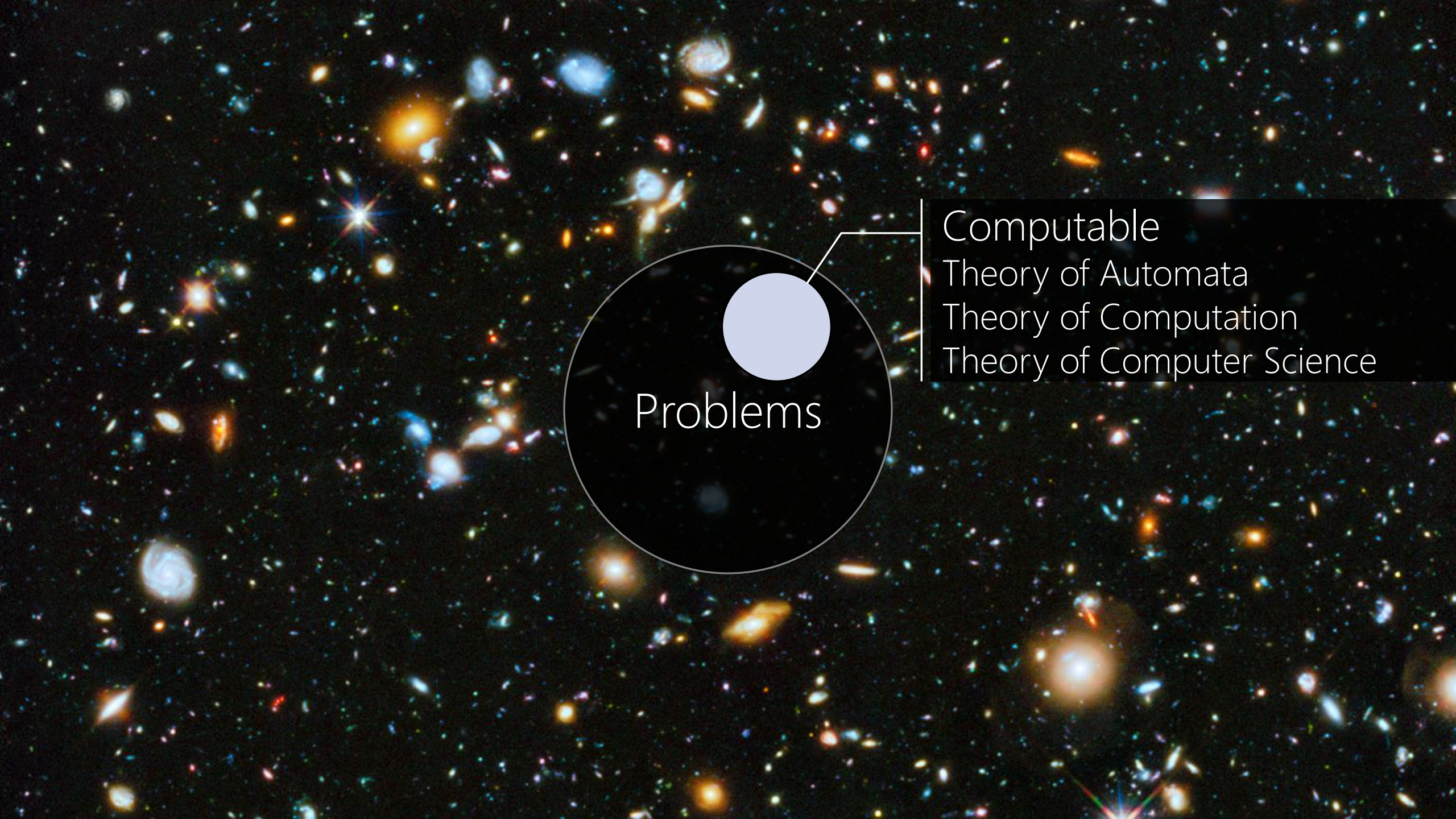


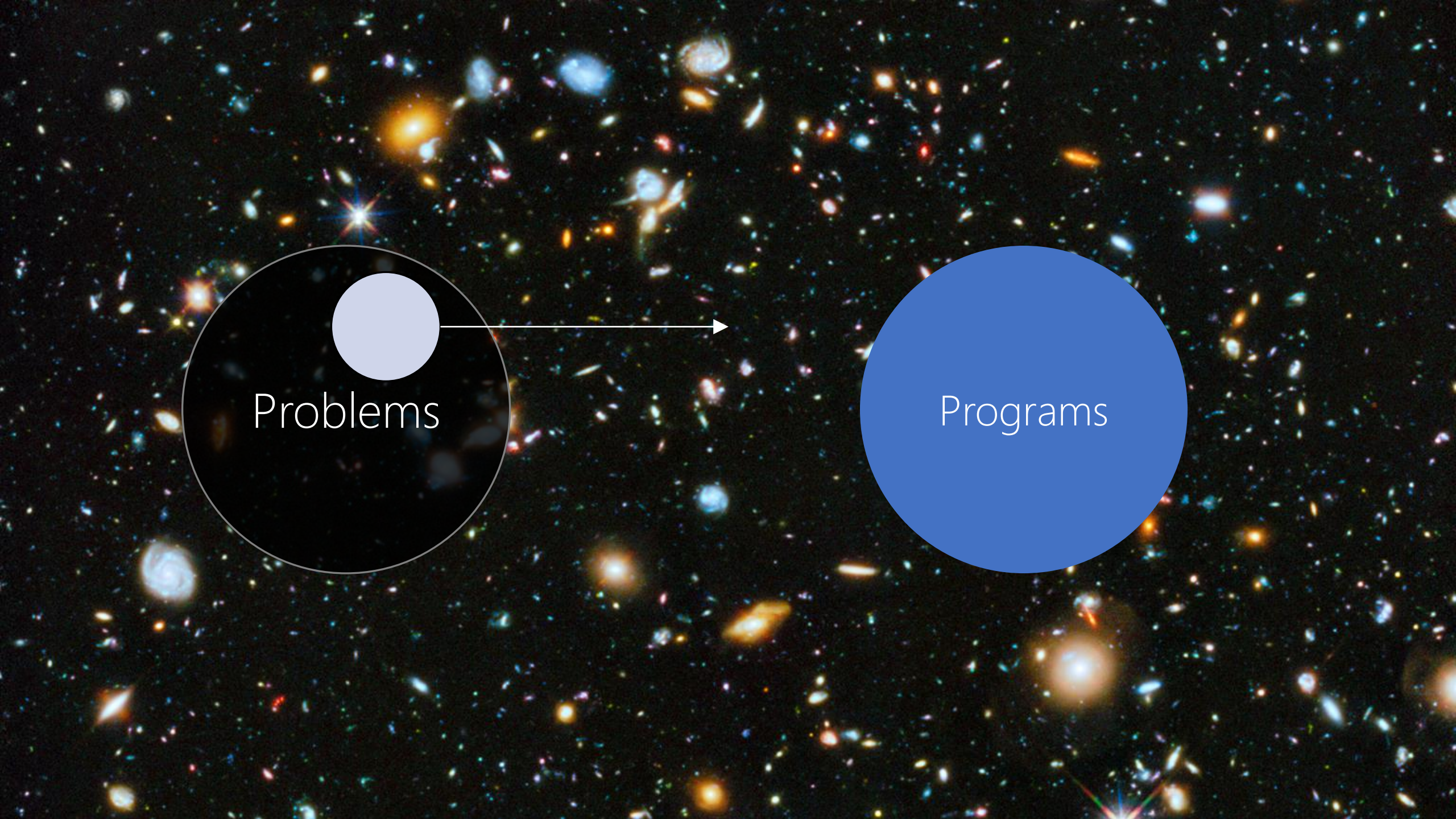
COMPUTER SCIENCE & COMPUTERS (GATES)
ASTRONOMY & TELESCOPES (STARS)

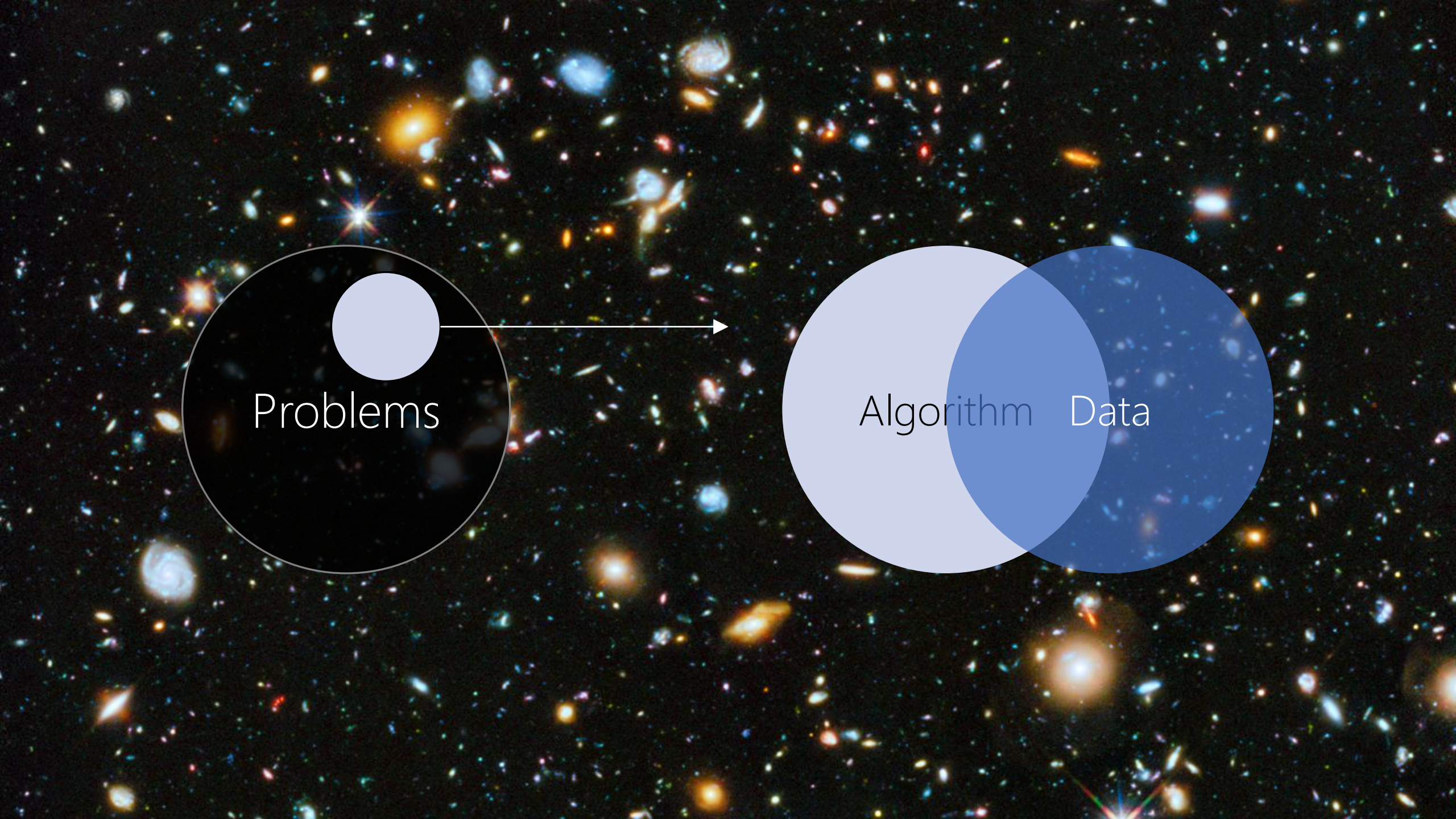
"Computer science is no more about computers than astronomy is about telescopes" - Edsger Dijkstra


Problems


Problems
Distance
Height
Length


Problems
Computable
Theory of Automata
Theory of Computation
Theory of Computer Science

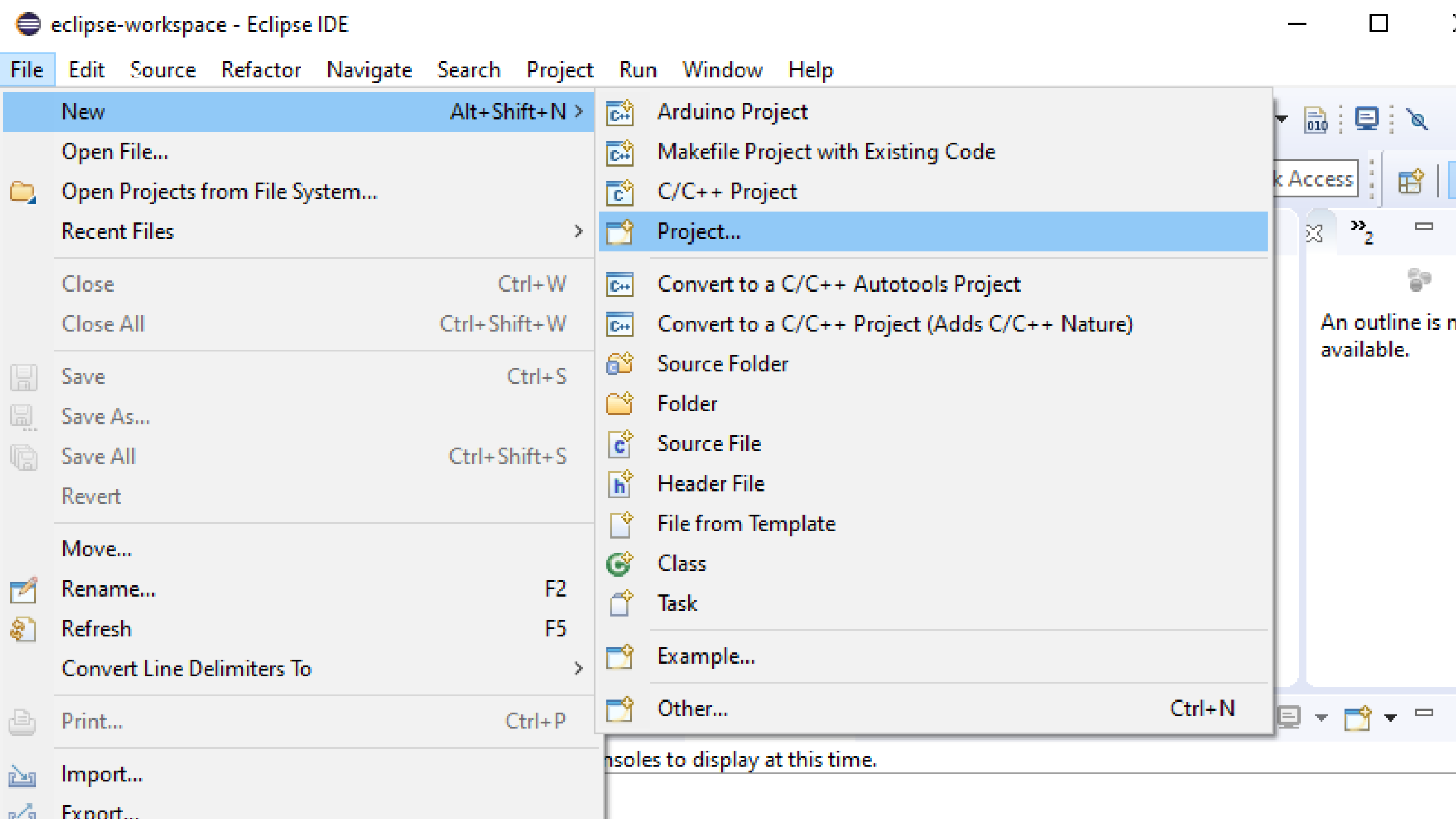

Problems
Programs

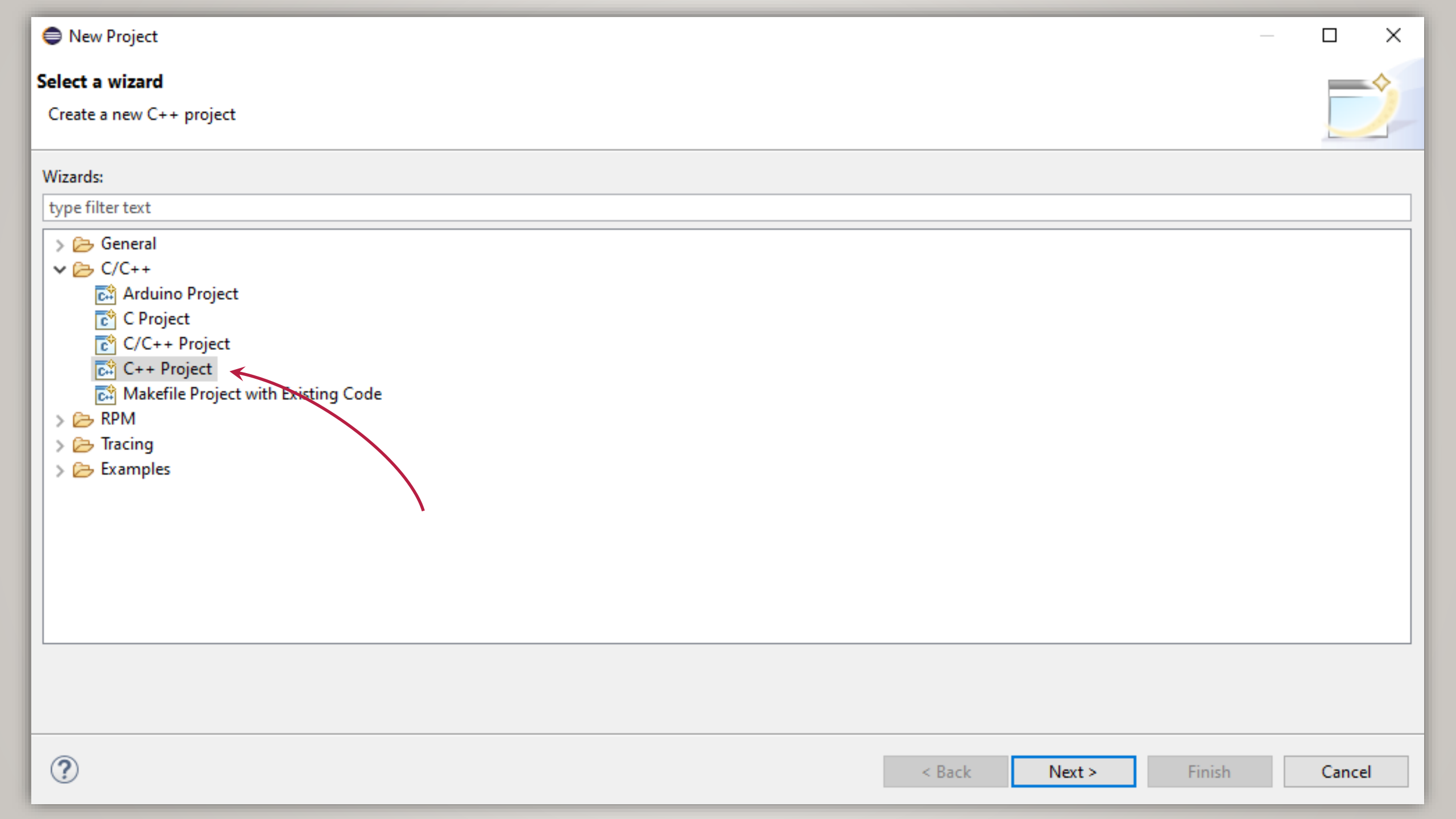

Problems
Algorithm
Data

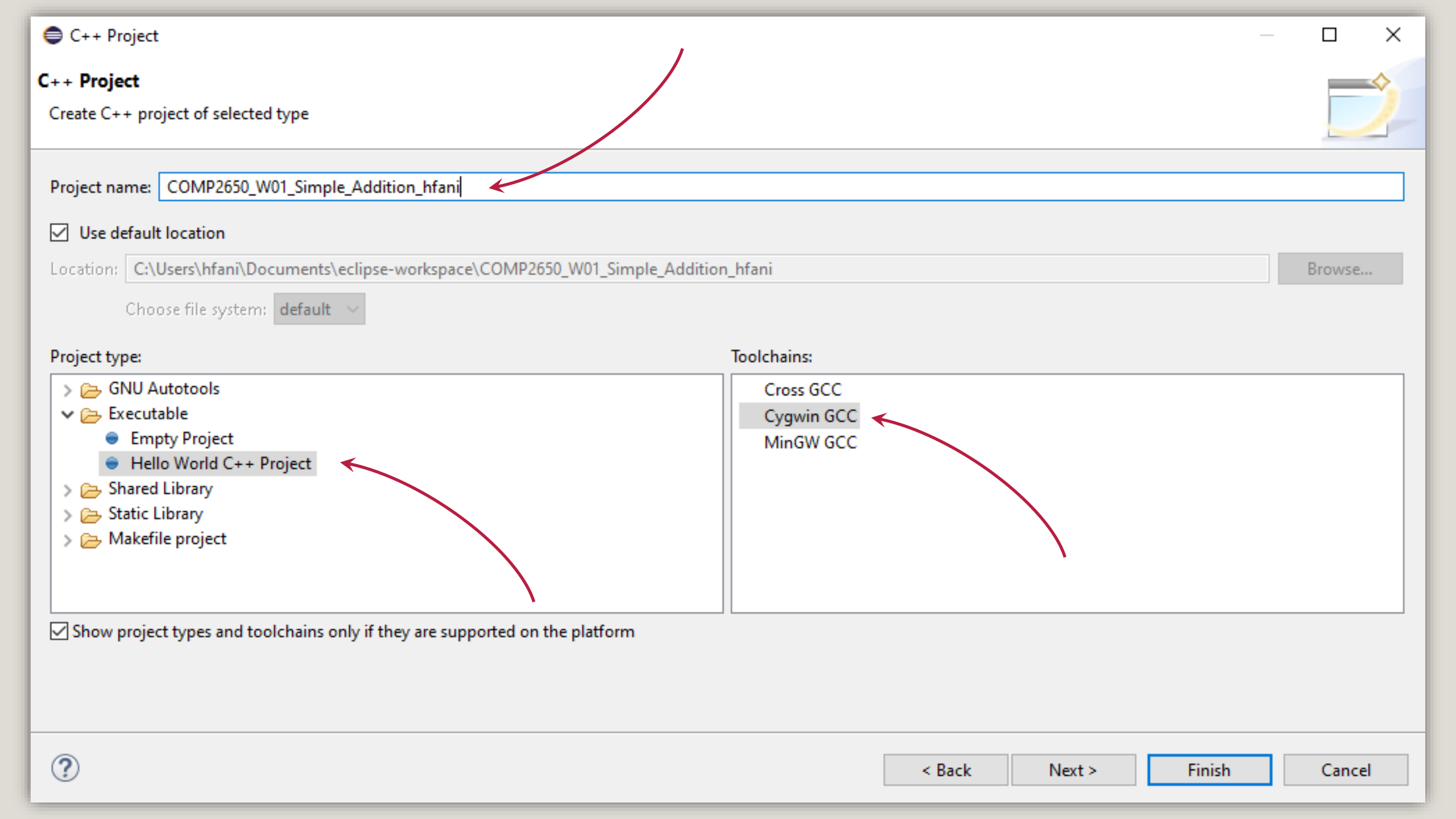
Algorithm Design
Algorithm Analysis
Artificial Intelligence (AI)
Machine Learning
Data Mining

Data Structure (Memory)
File Structure (File Systems)
Database Management Sys.
Data Warehouse
Big Data
Cloud


eclipse
2019-03
APACHE
NetBeans
[~]$ vi
Code::Blocks


eclipse-workspace - Eclipse IDE
File
Edit
Source
Refactor
Navigate
Search
Project
Run
Window
Help
New Alt+Shift+N
Open File...
Open Projects from File System...
Recent Files
Close Ctrl+W
Close All Ctrl+Shift+W
Save Ctrl+S
Save As...
Save All Ctrl+Shift+S
Revert
Move...
Rename... F2
Refresh F5
Convert Line Delimiters To
Print... Ctrl+P
Import...
Export...
Arduino Project
Makefile Project with Existing Code
C/C++ Project
Project...
Convert to a C/C++ Autotools Project
Convert to a C/C++ Project (Adds C/C++ Nature)
Source Folder
Folder
Source File
Header File
File from Template
Class
Task
Example...
Other... Ctrl+N
An outline is n
available.
nsoles to display at this time.


New Project
Select a wizard
Create a new C++ project
Wizards:
type filter text
General
C/C++
Arduino Project
C Project
C/C++ Project
C++ Project
Makefile Project with Existing Code
RPM
Tracing
Examples
< Back
Next >
Finish
Cancel


C++ Project
C++ Project
Create C++ project of selected type
Project name: COMP2650_W01_Simple_Addition_hfani
Use default location
Location: C:\Users\hfani\Documents\eclipse-workspace\COMP2650_W01_Simple_Addition_hfani
Browse...
Choose file system: default
Project type:
GNU Autotools
Executable
Empty Project
Hello World C++ Project
Shared Library
Static Library
Makefile project
Toolchains:
Cross GCC
Cygwin GCC
MinGW GCC
Show project types and toolchains only if they are supported on the platform
< Back
Next >
Finish
Cancel

eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Run | COMP2650_W01_A_Simple_Additi | Quick Access

C/C++ Projects

- COMP2650_W01_Simple_Addition_hfani
  - Includes
  - src
    - COMP2650_W01_Simple_Addition_hfani.cpp

COMP2650_W01_Simple_Addition_hfani.cpp

```
1  //============================================================================
2  // Name        : COMP2650_W01_Simple_Addition_hfani.cpp
3  // Author      : hfani@uwindsor.ca
4  // Version     :
5  // Copyright   :
6  // Description : Hello World in C++, Ansi-style
7  //============================================================================
8
9  #include <iostream>
10 using namespace std;
11
12 int main() {
13     cout << "" << endl; // prints
14     return 0;
15 }
16
```

Outline

- iostream
- std
- main() : int

Task List | Build ...

Problems | Properties

0 items

Description	Resource	Path	Location	Type

Writable | Smart Insert | 16 : 1

eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Run | COMP2650_W01_A_Simple_Additi | Quick Access

C/C++ Projects

- COMP2650_W01_Simple_Addition_hfani
  - Includes
  - src
    - COMP2650_W01_Simple_Addition_hfani.cpp

COMP2650_W01_Simple_Addition_hfani.cpp

```
1 int main() {
2     return 0;
3 }
4
```

Outline | Task List | Build

main() : int

Problems | Properties

0 items

Description	Resource	Path	Location	Type

Writable | Smart Insert | 2 : 1

eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Run | COMP2650_W01_A_Simple_Additi | Quick Access

C/C++ Projects

- COMP2650_W01_Simple_Addition_hfani
  - Binaries
  - Includes
  - src
    - COMP2650_W01_Simple_Addition_hfani.cpp
  - Debug

COMP2650_W01_Simple_Addition_hfani.cpp

```
1  #include <stdio.h>
2  int Add(int a, int b){
3      int result = a + b;
4      return result;
5  }
6  int main() {
7
8      int number1;
9      int number2;
10     printf("Enter two numbers:\n");
11
12     scanf("%d", &number1);
13     scanf("%d", &number2);
14
15     int sum = Add(number1, number2);
16
17     printf("%d + %d = %d", number1, number2, sum);
18
19     return 0;
20 }
```

Outline

- stdio.h
- Add(int, int) : int
- main() : int

Task List | Build

Problems | Console | Properties

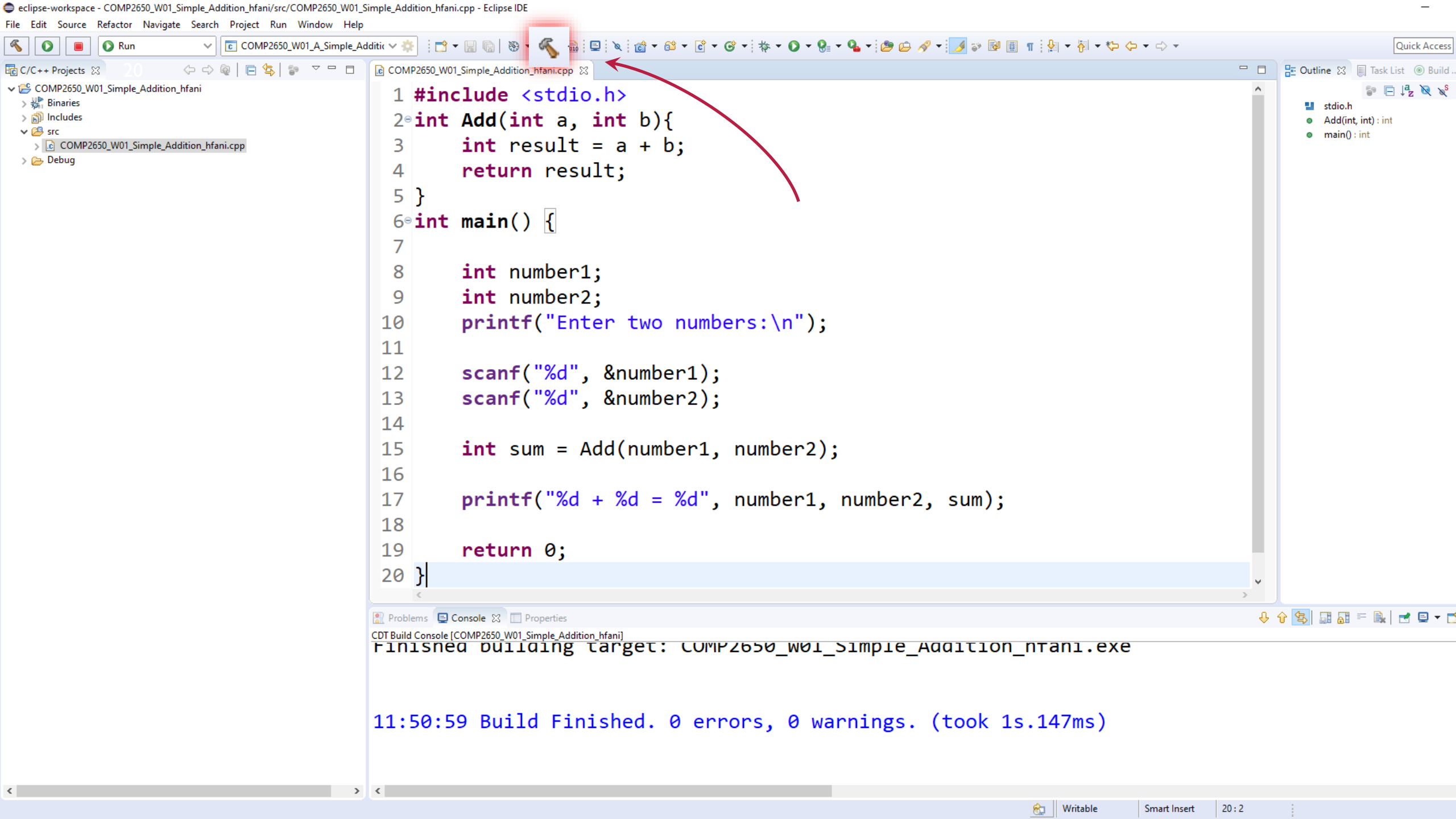
CDT Build Console [COMP2650_W01_Simple_Addition_hfani]

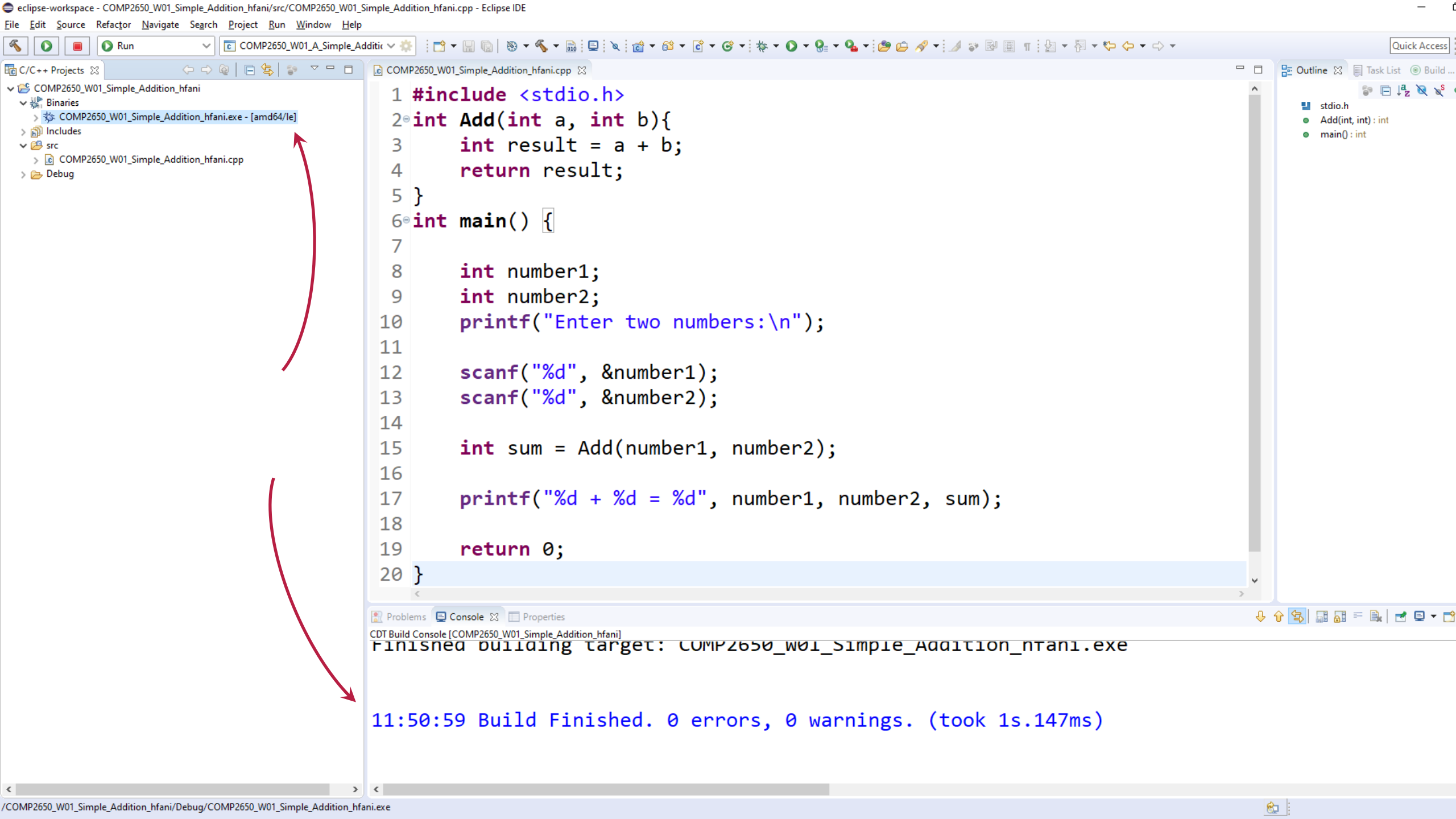
```
Finished building target: COMP2650_W01_Simple_Addition_hfani.exe


11:50:59 Build Finished. 0 errors, 0 warnings. (took 1s.147ms)
```

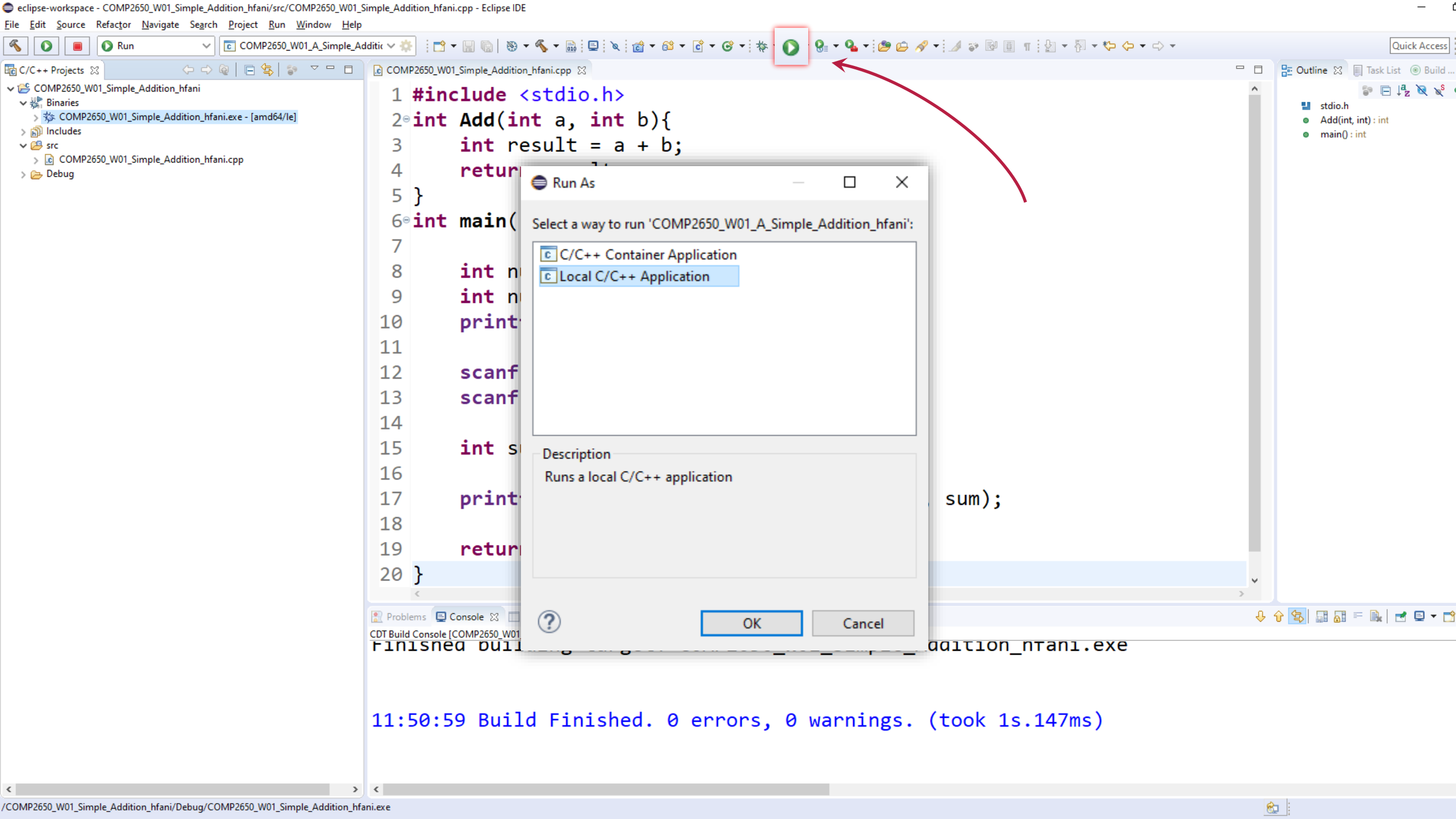
Writable | Smart Insert | 20 : 2

```c
int Add(int a, int b){
    int result = a + b;
    return result;
}
```

```
14
15      int sum = Add(number1, number2);
16
```


eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Run
COMP2650_W01_A_Simple_Additi
Quick Access
C/C++ Projects
COMP2650_W01_Simple_Addition_hfani
Binaries
Includes
src
COMP2650_W01_Simple_Addition_hfani.cpp
Debug
COMP2650_W01_Simple_Addition_hfani.cpp
1 #include <stdio.h>
2 int Add(int a, int b){
3 int result = a + b;
4 return result;
5 }
6 int main() {
7
8 int number1;
9 int number2;
10 printf("Enter two numbers:\n");
11
12 scanf("%d", &number1);
13 scanf("%d", &number2);
14
15 int sum = Add(number1, number2);
16
17 printf("%d + %d = %d", number1, number2, sum);
18
19 return 0;
20 }
Outline
Task List
Build
stdio.h
Add(int, int) : int
main() : int
Problems
Console
Properties
CDT Build Console [COMP2650_W01_Simple_Addition_hfani]
Finished building target: COMP2650_W01_Simple_Addition_hfani.exe
11:50:59 Build Finished. 0 errors, 0 warnings. (took 1s.147ms)
Writable
Smart Insert
20 : 2


eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Run
COMP2650_W01_A_Simple_Additic
Quick Access
C/C++ Projects
COMP2650_W01_Simple_Addition_hfani
Binaries
COMP2650_W01_Simple_Addition_hfani.exe - [amd64/le]
Includes
src
COMP2650_W01_Simple_Addition_hfani.cpp
Debug
COMP2650_W01_Simple_Addition_hfani.cpp
1 #include <stdio.h>
2 int Add(int a, int b){
3 int result = a + b;
4 return result;
5 }
6 int main() {
7
8 int number1;
9 int number2;
10 printf("Enter two numbers:\n");
11
12 scanf("%d", &number1);
13 scanf("%d", &number2);
14
15 int sum = Add(number1, number2);
16
17 printf("%d + %d = %d", number1, number2, sum);
18
19 return 0;
20 }
Outline
Task List
Build ...
stdio.h
Add(int, int) : int
main() : int
Problems
Console
Properties
CDT Build Console [COMP2650_W01_Simple_Addition_hfani]
Finished building target: COMP2650_W01_Simple_Addition_hfani.exe
11:50:59 Build Finished. 0 errors, 0 warnings. (took 1s.147ms)
/COMP2650_W01_Simple_Addition_hfani/Debug/COMP2650_W01_Simple_Addition_hfani.exe


eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Run
COMP2650_W01_A_Simple_Additi
Quick Access
C/C++ Projects
COMP2650_W01_Simple_Addition_hfani
Binaries
COMP2650_W01_Simple_Addition_hfani.exe - [amd64/le]
Includes
src
COMP2650_W01_Simple_Addition_hfani.cpp
Debug
COMP2650_W01_Simple_Addition_hfani.cpp
1 #include <stdio.h>
2 int Add(int a, int b){
3 int result = a + b;
4 retur
5 }
6 int main(
7
8 int n
9 int n
10 print
11
12 scanf
13 scanf
14
15 int s
16
17 print
18
19 retur
20 }
sum);
Outline
Task List
Build ...
stdio.h
Add(int, int) : int
main() : int
Run As
Select a way to run 'COMP2650_W01_A_Simple_Addition_hfani':
C/C++ Container Application
Local C/C++ Application
Description
Runs a local C/C++ application
OK
Cancel
Problems
Console
CDT Build Console [COMP2650_W01
Finished build
ddition_hfani.exe
11:50:59 Build Finished. 0 errors, 0 warnings. (took 1s.147ms)
/COMP2650_W01_Simple_Addition_hfani/Debug/COMP2650_W01_Simple_Addition_hfani.exe

```
Enter two integers:
12
35
12 + 35 = 47
```

```
Enter two integers:
999999
1
999999 + 1 = 1000000
```

```
Enter two integers:
999999999999999
1
```

```
Enter two integers:
999999999999999
1
-1530494977 + 1 = -1530494976
```

```
Enter two integers:
999999999999999
1
-1530494977 + 1 = -15304949766
```

eclipse-workspace - COMP2650_W01_Simple_Addition_hfani/src/COMP2650_W01_Simple_Addition_hfani.cpp - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Run | COMP2650_W01_Simple_Addition | Quick Access

C/C++ Projects

- COMP2650_W01_Simple_Addition_hfani
  - Binaries
    - COMP2650_W01_Simple_Addition_hfani.exe - [amd64/le]
  - Includes
  - src
    - COMP2650_W01_Simple_Addition_hfani.cpp
  - Debug

COMP2650_W01_Simple_Addition_hfani.cpp

```
1  #include <stdio.h>
2  #include <limits.h>
3  int Add(int a, int b){
4      int result = a + b;
5      return result;
6  }
7  int main() {
8
9      int number1;
10     int number2;
11     printf("Enter two numbers between %d and %d:\n", INT_MIN, INT_MAX);
12
13     scanf("%d", &number1);
14     scanf("%d", &number2);
15
16     int sum = Add(number1, number2);
17
18     printf("%d + %d = %d", number1, number2, sum);
19
20     return 0;
21 }
22
```

Outli... | Task... | Buil...

- stdio.h
- limits.h
- Add(int, int) : int
- main() : int

Problems | Console | Properties

CDT Build Console [COMP2650_W01_Simple_Addition_hfani]

Finished building target: COMP2650_W01_Simple_Addition_hfani.exe

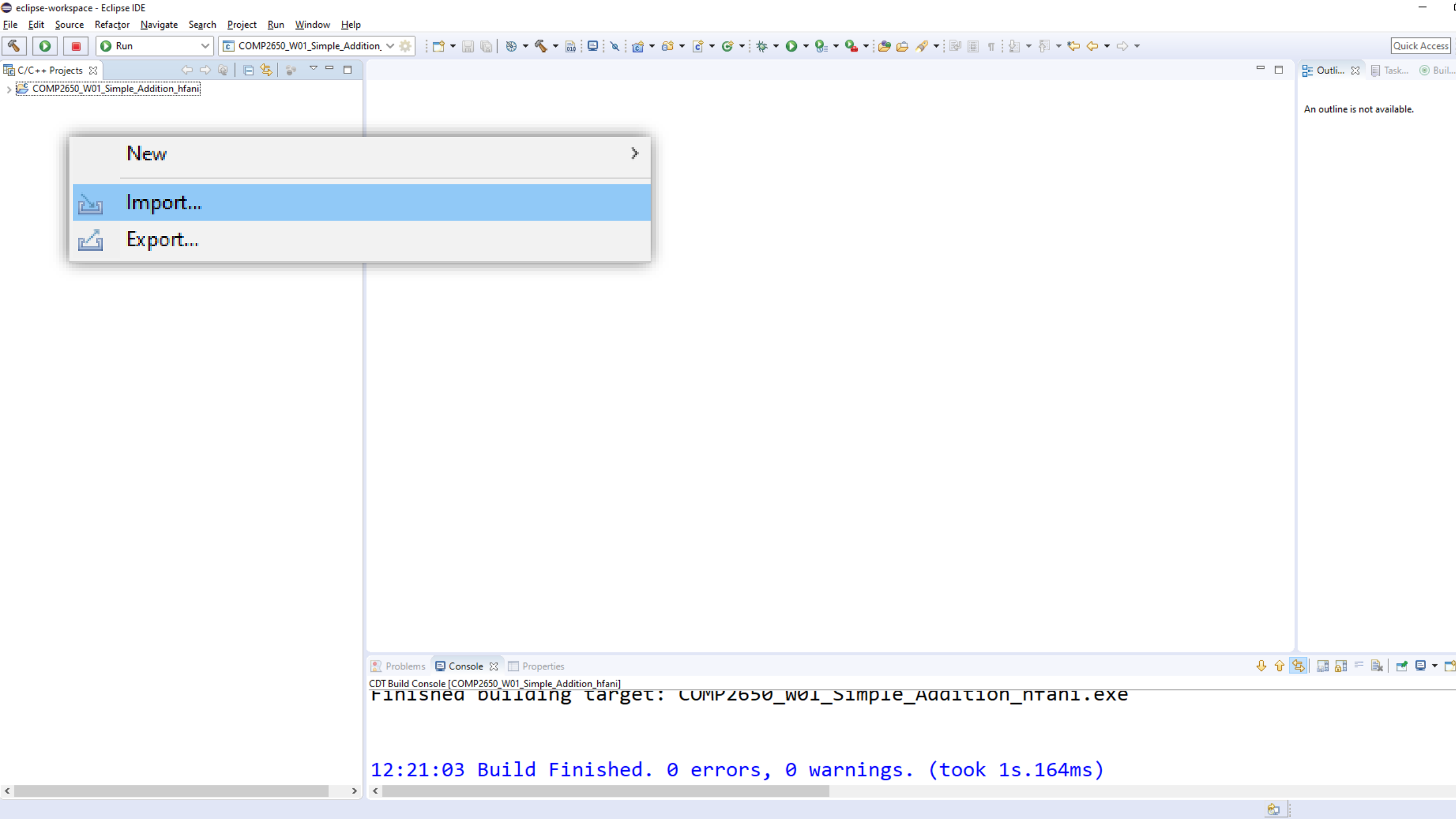
12:21:03 Build Finished. 0 errors, 0 warnings. (took 1s.164ms)

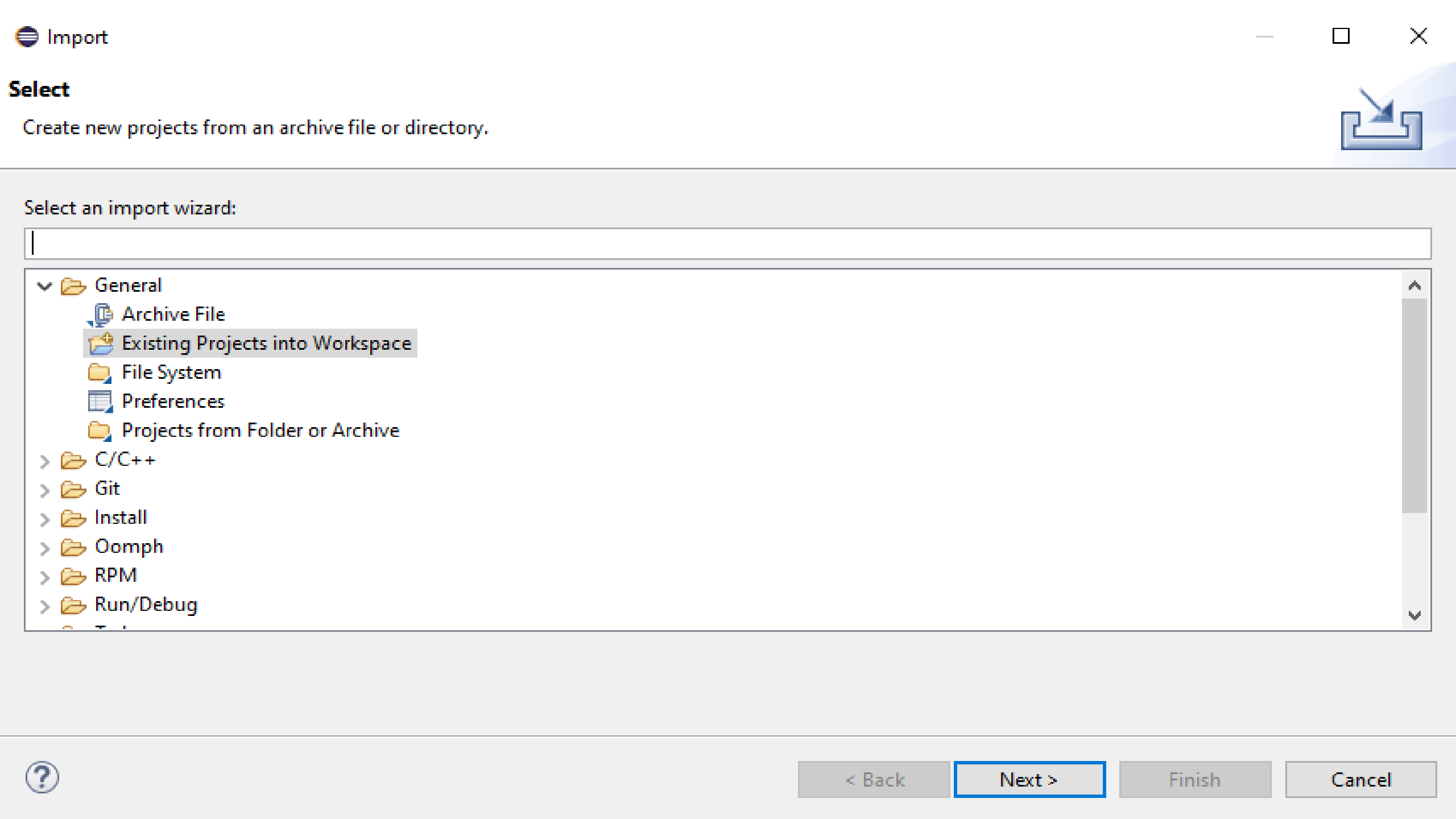
```
Enter two integers between -2147483648 and 2147483647:
12
15
12 + 15 = 27
```

```
Enter two integers between -2147483648 and 2147483647:
2147483647
1
```

```
Enter two integers between -2147483648 and 2147483647:
2147483647
1
2147483647 + 1 = -2147483648
```

```
Enter two integers between -2147483648 and 2147483647:
2147483647
2
2147483647 + 2 = -2147483647
```


eclipse-workspace - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Run
COMP2650_W01_Simple_Addition_
Quick Access
C/C++ Projects
COMP2650_W01_Simple_Addition_hfani
New
Import...
Export...
Outli...
Task...
Buil...
An outline is not available.
Problems
Console
Properties
CDT Build Console [COMP2650_W01_Simple_Addition_hfani]
Finished building target: COMP2650_W01_Simple_Addition_hfani.exe
12:21:03 Build Finished. 0 errors, 0 warnings. (took 1s.164ms)


Import
Select
Create new projects from an archive file or directory.
Select an import wizard:
General
Archive File
Existing Projects into Workspace
File System
Preferences
Projects from Folder or Archive
C/C++
Git
Install
Oomph
RPM
Run/Debug
< Back
Next >
Finish
Cancel

Import

Import Projects

Select a directory to search for existing Eclipse projects.

Select root directory: C:\Users\hfani\Documents\eclipse-workspace\COMP2650_W01_Large_Addition_hfani — Browse...

Select archive file: — Browse...

Projects:

- [x] COMP2650_W01_Large_Addition_hfani (C:\Users\hfani\Documents\eclipse-workspace\COMP2650_W01_Large_Addition_hfani)

Select All

Deselect All

Refresh

Options

- [ ] Search for nested projects
- [ ] Copy projects into workspace
- [ ] Close newly imported projects upon completion
- [ ] Hide projects that already exist in the workspace

Working sets

- [ ] Add project to working sets — New...

Working sets: — Select...

< Back | Next > | Finish | Cancel

```
1 //Chitra Nayal, Mithun Kumar, Shivam Kushik, 04-06-2019, Sum of two large numbers
2 //Retrieved from https://www.geeksforgeeks.org/sum-two-large-numbers/
```

```
22      int carry = 0;
23      for (int i = 0; i < n1; i++) {
24          // Do school mathematics, compute sum of current digits and car
25          int sum = ((a[i] - '0') + (b[i] - '0') + carry);
26          result.push_back(sum % 10 + '0');
27          // Calculate carry for next step
28          carry = sum / 10;
29      }
```

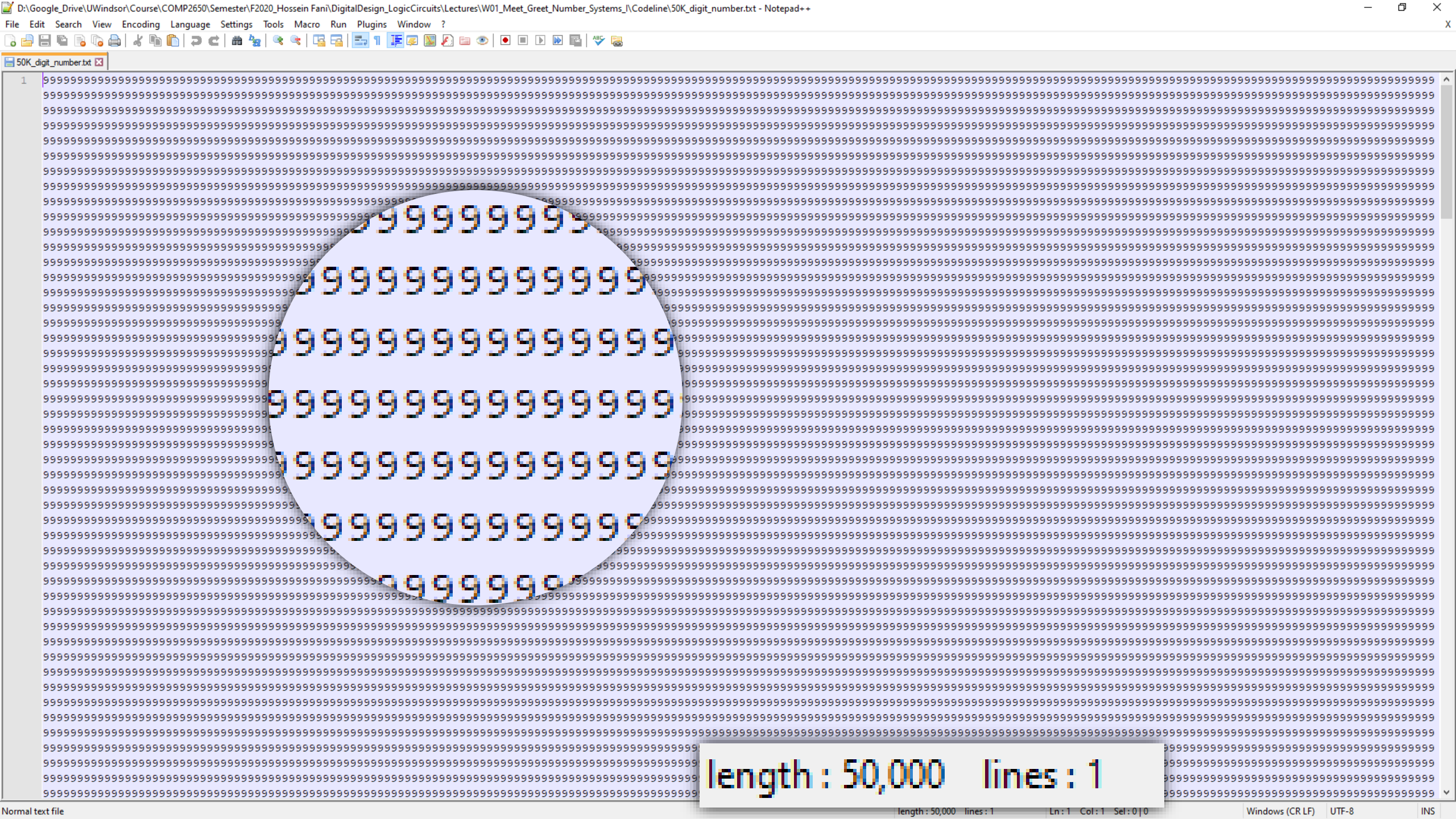
```
Enter two integers:
2147483647
1
2147483647 + 1 = 2147483648
```

```
Enter two integers:
99999999999999999999999999999999999999999
1
99999999999999999999999999999999999999999 + 1 = 100000000000000000000000000000000000000000
```

D:\Google_Drive\UWindsor\Course\COMP2650\Semester\F2020_Hossein Fani\DigitalDesign_LogicCircuits\Lectures\W01_Meet_Greet_Number_Systems_I\Codeline\50K_digit_number.txt - Notepad++

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

50K_digit_number.txt



Normal text file length : 50,000 lines : 1 Ln : 1 Col : 1 Sel : 0 | 0 Windows (CR LF) UTF-8 INS

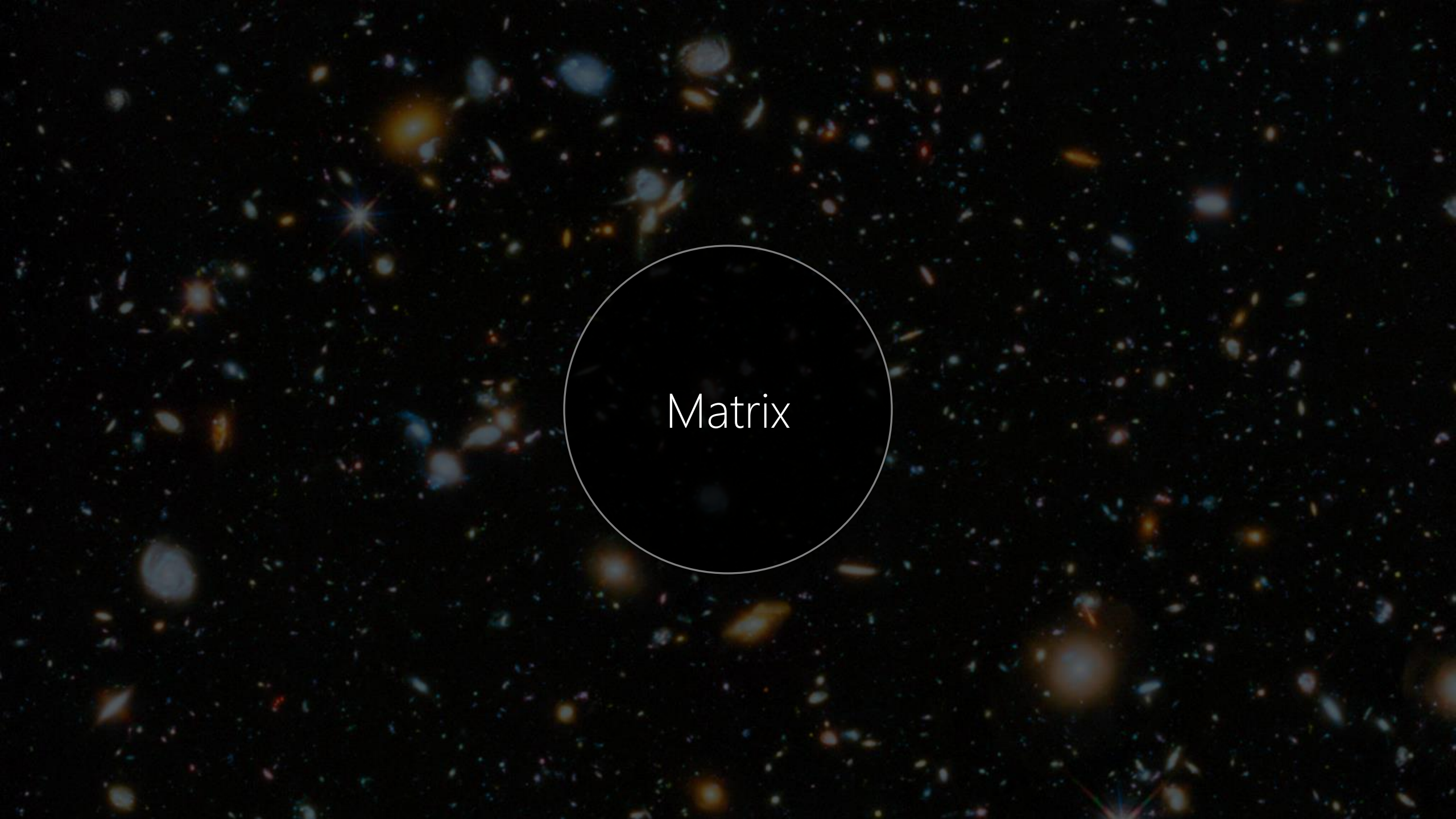
Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
999...99999 + 999...99999 = ?

Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
999...99999 + 999...99999 = 1999 ... 9998 => 50,001 digits

```
Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
999...99999 + 999...99999 = 1999 ... 9998 => 50,001 digits
Total time = ?
```

```
Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
999...99999 + 999...99999 = 1999 ... 9998 => 50,001 digits
Total time = 0.000000
```

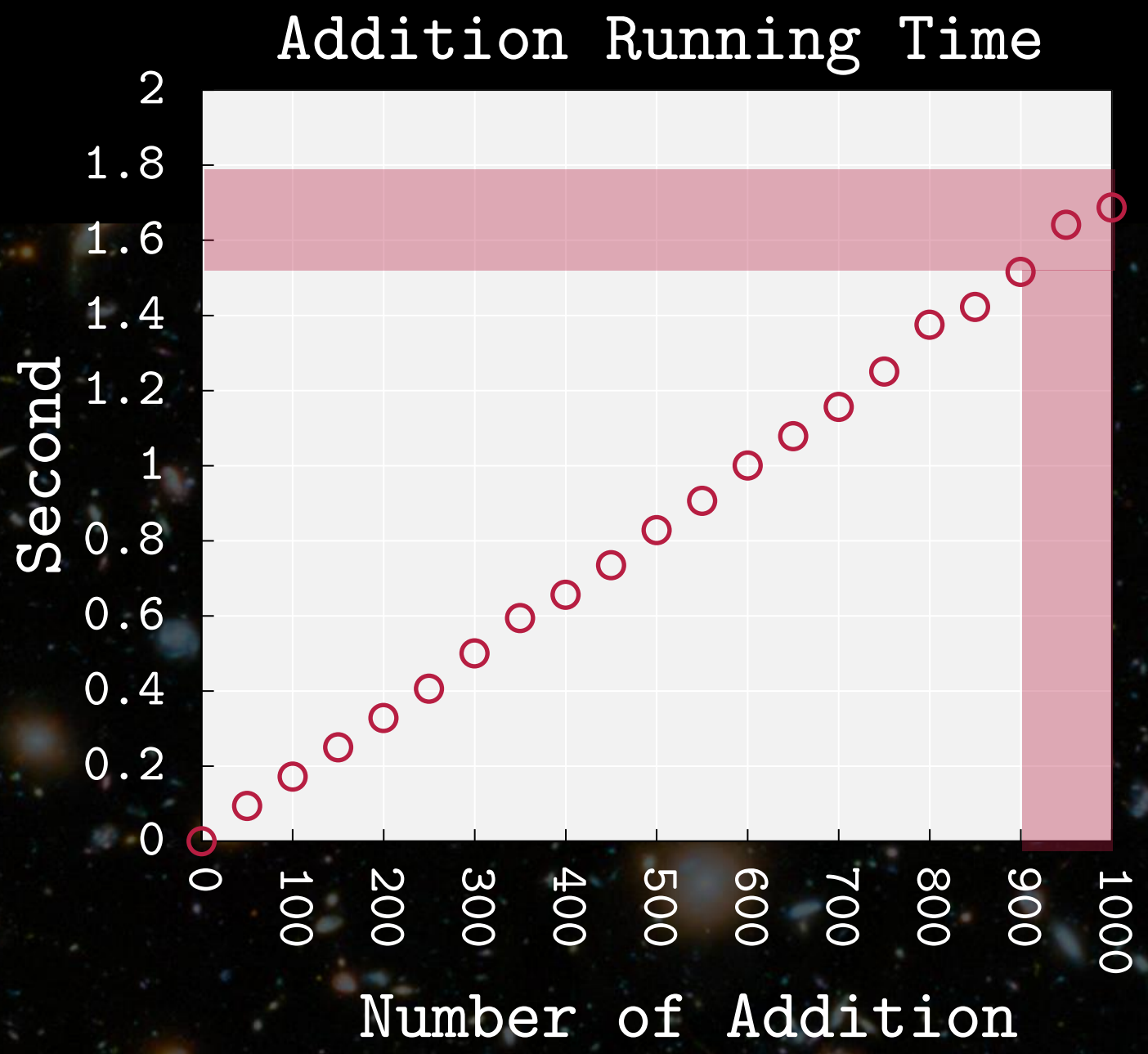
Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
How many iterations:
?
Total time = ?

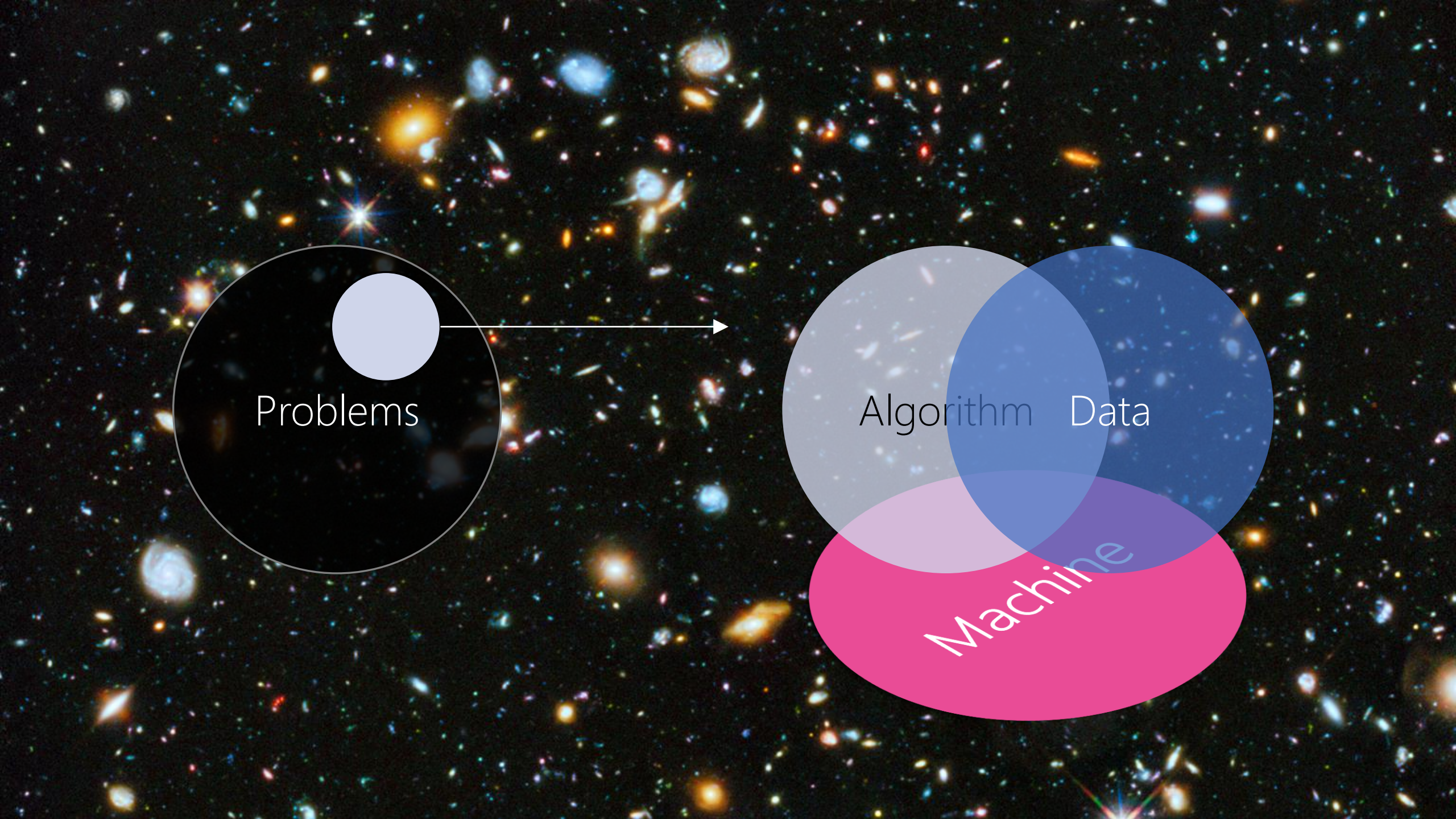

Matrix

```
Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
How many iterations:
1
Total time = 0.000000
```

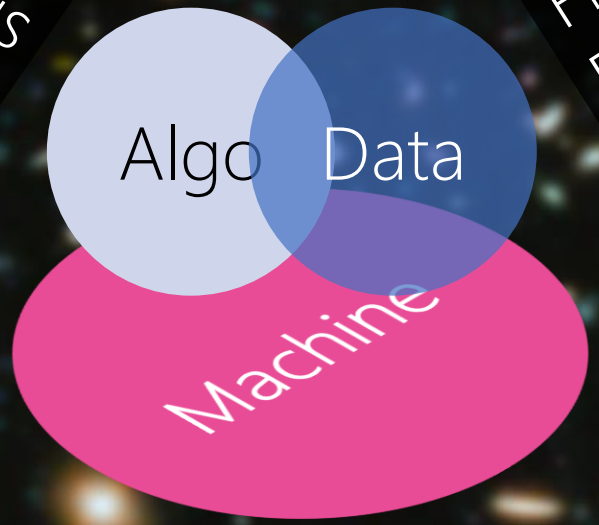
```
Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
How many iterations:
100
Total time = ?
```

Enter two integers:
999...99999 => 50,000 digits
999...99999 => 50,000 digits
How many iterations:
1,2,3,...,900,..., 1000
Total time =



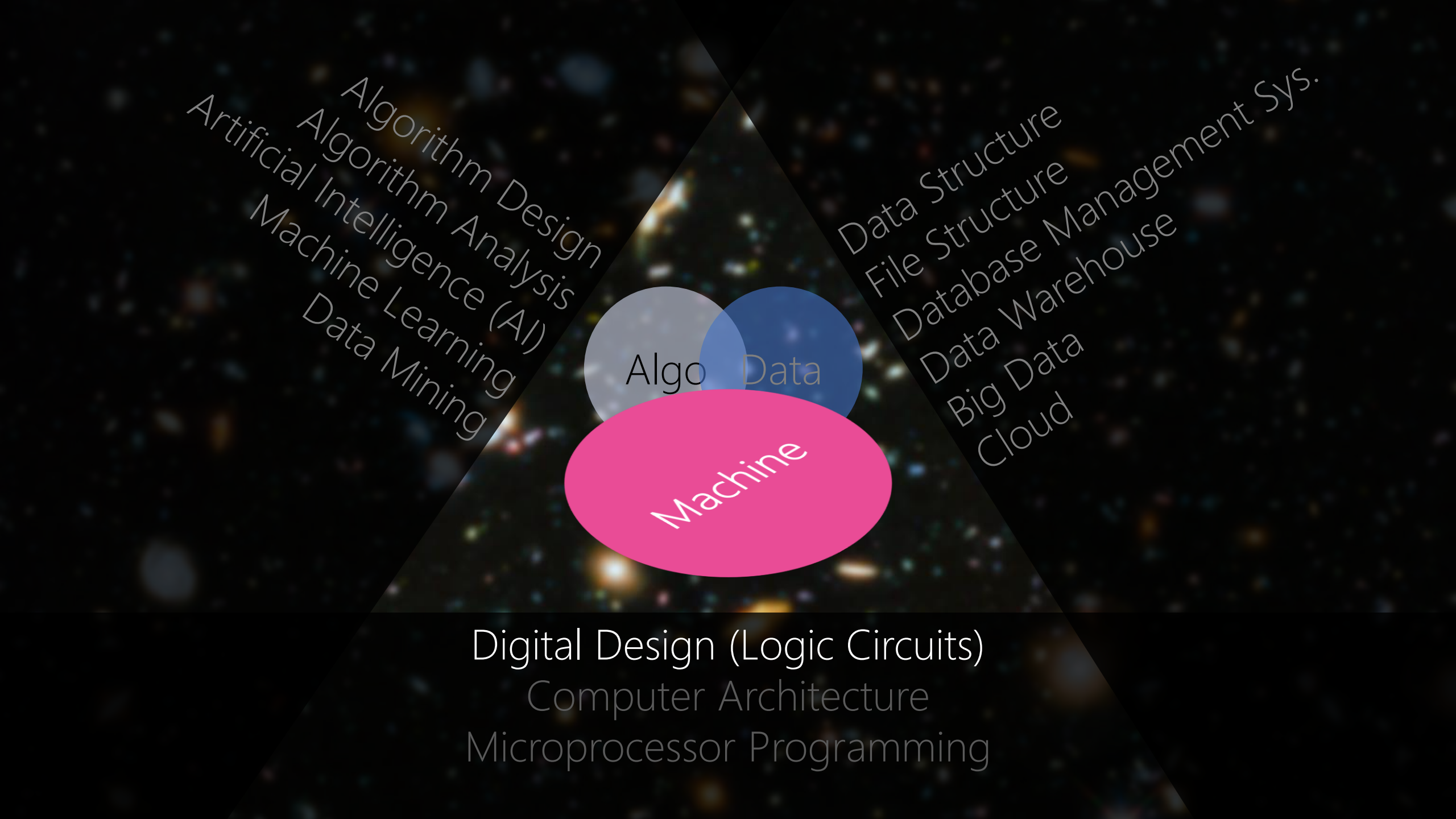

Problems
Algorithm
Data
Machine

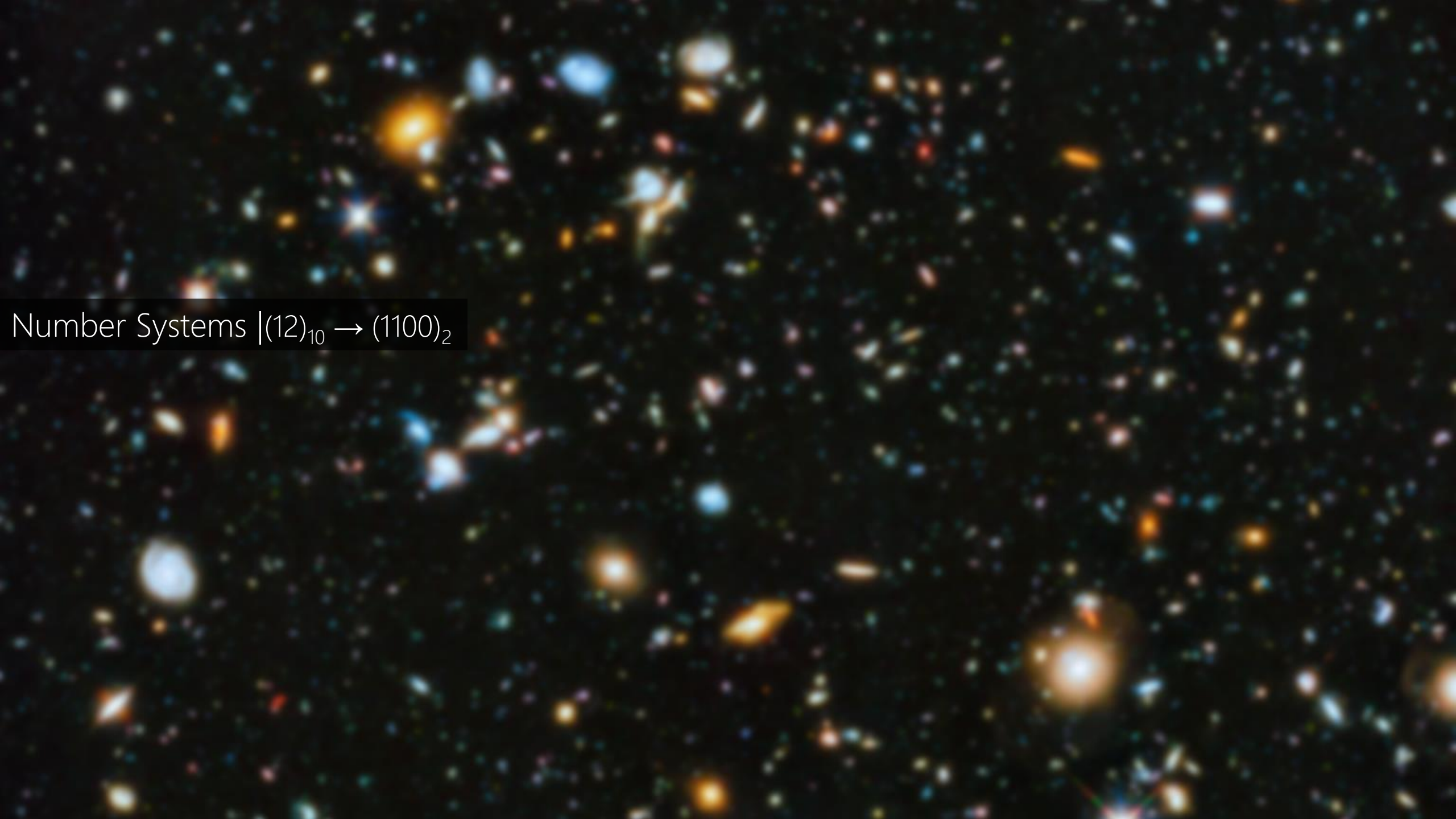
Algorithm Design
Algorithm Analysis
Artificial Intelligence (AI)
Machine Learning
Data Mining



Data Structure
File Structure
Database Management Sys.
Data Warehouse
Big Data
Cloud

Digital Design (Logic Circuits)
Computer Architecture
Microprocessor Programming


Algorithm Design
Algorithm Analysis
Artificial Intelligence (AI)
Machine Learning
Data Mining
Data Structure
File Structure
Database Management Sys.
Data Warehouse
Big Data
Cloud
Algo
Data
Machine
Digital Design (Logic Circuits)
Computer Architecture
Microprocessor Programming

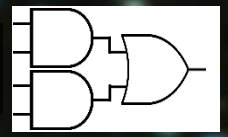

Number Systems | $(12)_{10} \rightarrow (1100)_2$

Number Systems | $(12)_{10} \rightarrow (1100)_2$

Logic Gates | 

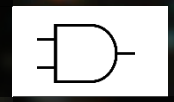
Number Systems | $(12)_{10} \rightarrow (1100)_2$

Logic Gates | 

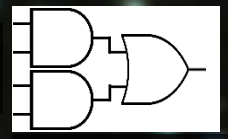
Combinational Logic | 

Number Systems | $(12)_{10} \rightarrow (1100)_2$

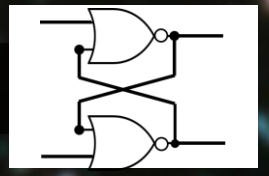
Logic Gates |



Combinational Logic |



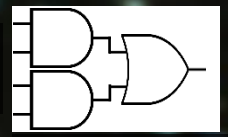
Flip-Flop |



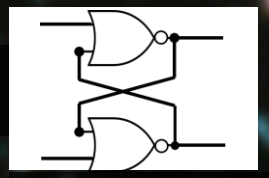
Number Systems $|(12)_{10} \rightarrow (1100)_2$

Logic Gates |

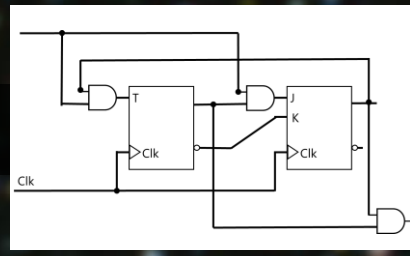
Combinational Logic |



Flip-Flop |

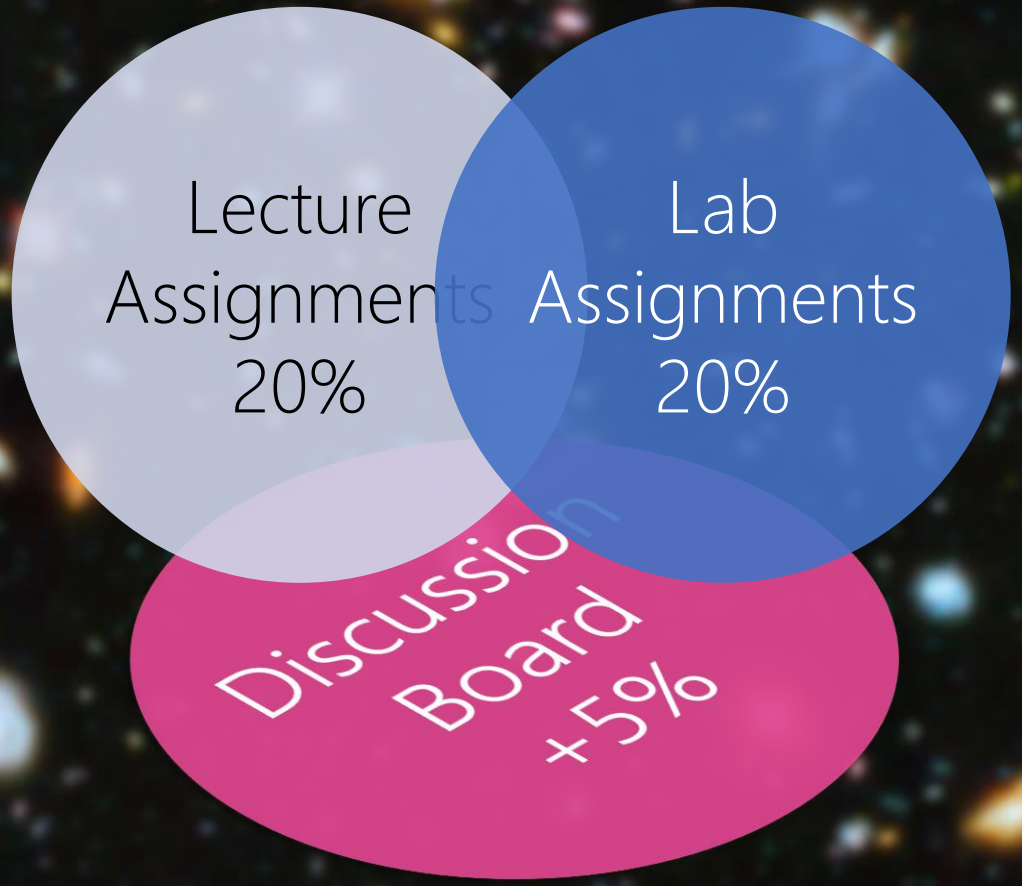


Sequential Logic |



W2022: A Digital Odyssey

The Ultimate Trip.

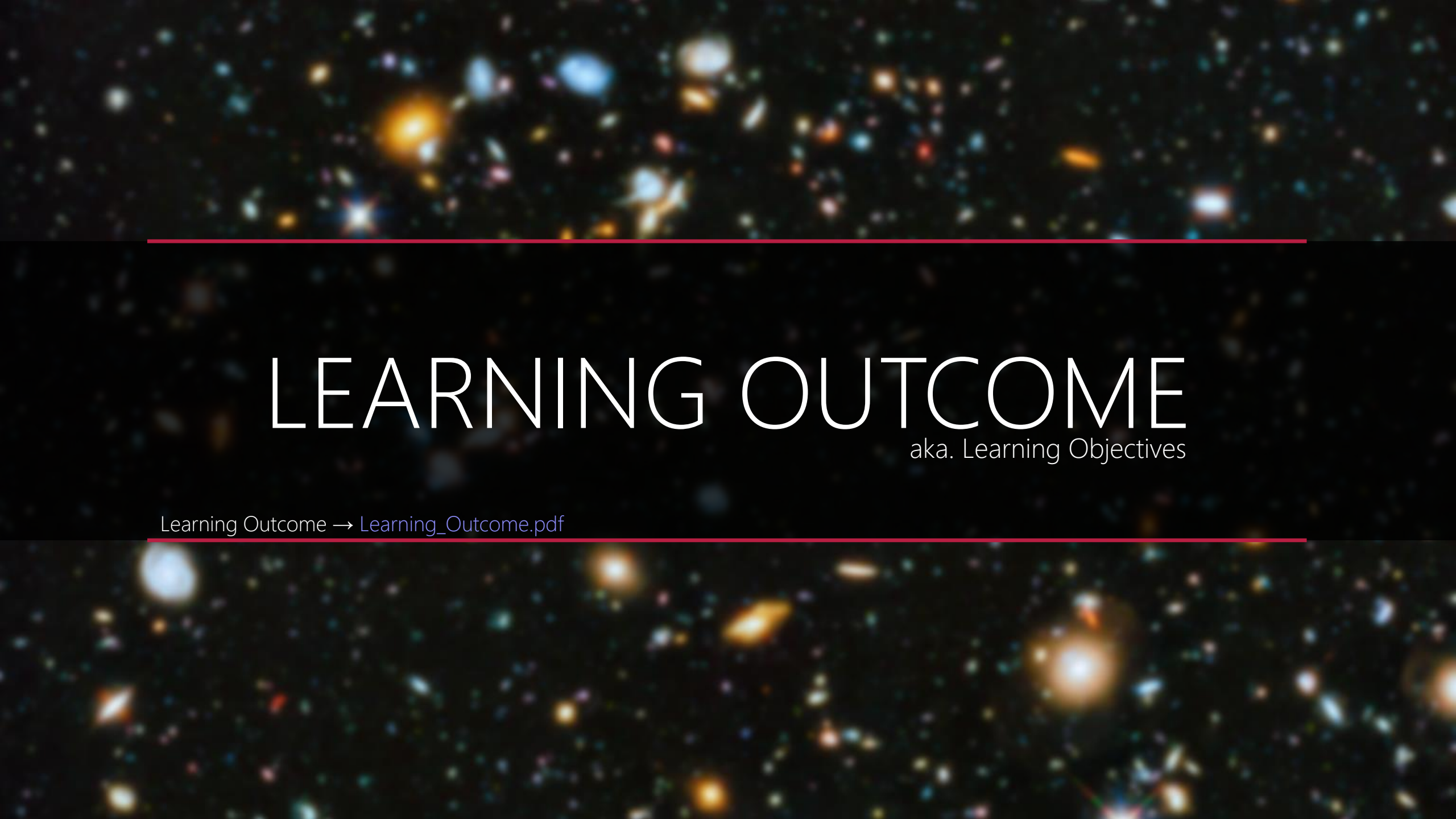


Midterm Exam
30%

Final Exam
30%

BLACKBOARD TOUR

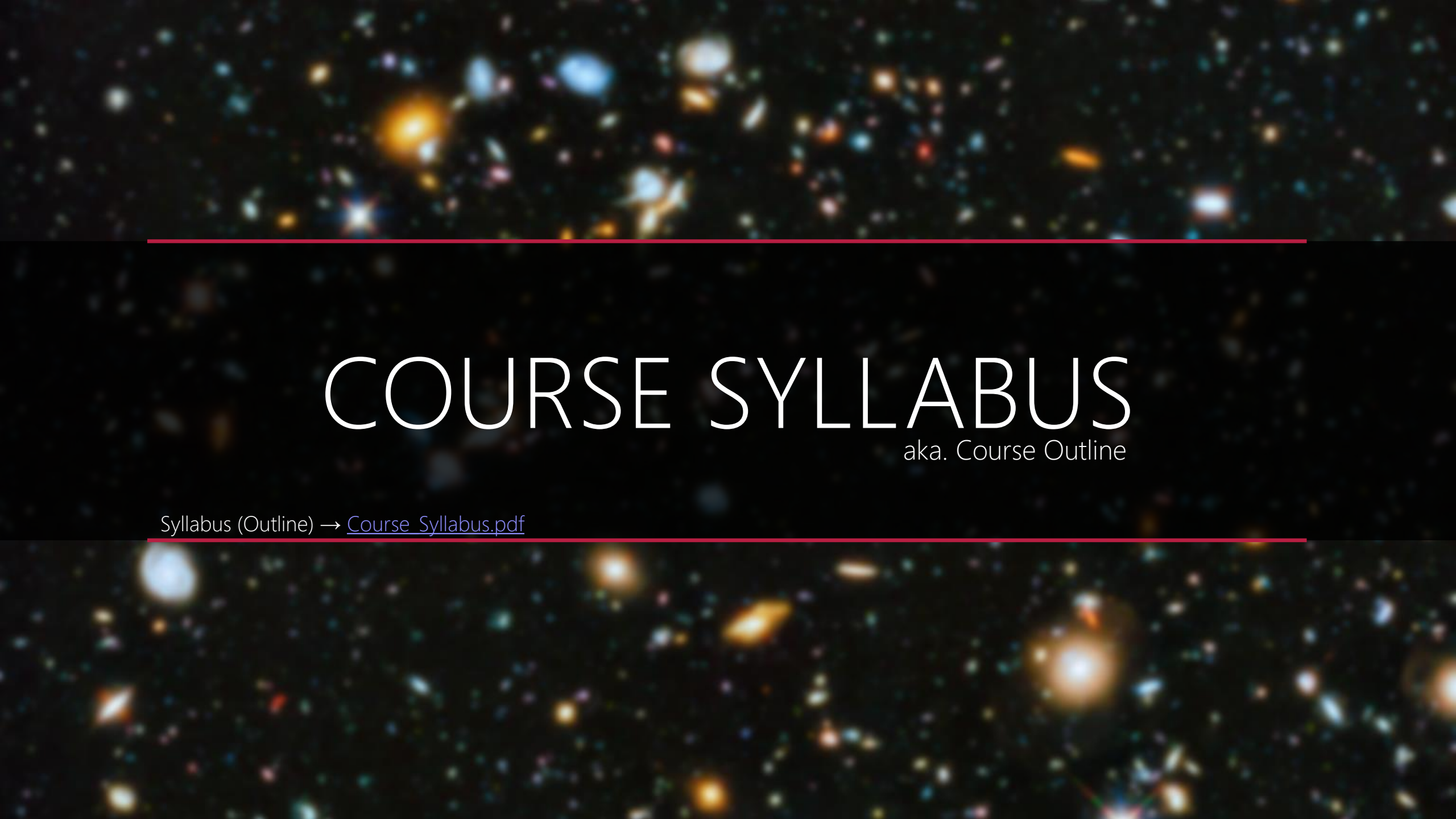
Lectures → How To Find → Blackboard Tutorial Video 1: Course Homepage Tour



LEARNING OUTCOME

aka. Learning Objectives

Learning Outcome → Learning_Outcome.pdf



COURSE SYLLABUS

aka. Course Outline

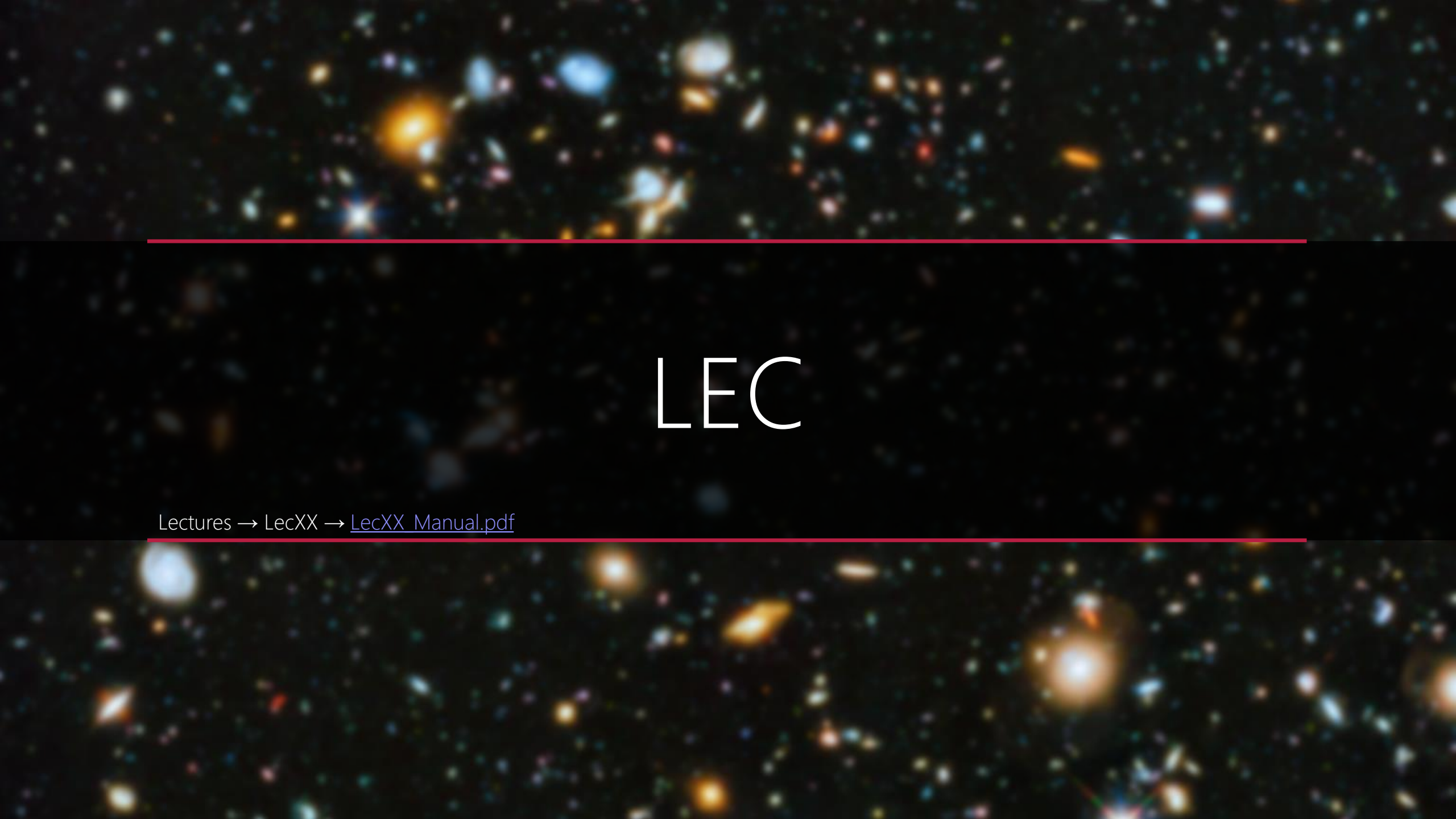
Syllabus (Outline) → Course_Syllabus.pdf

LAB INSTRUCTORS

Based on the lab section you register
Anything about submissions, communicate with the lab instructor foremost!

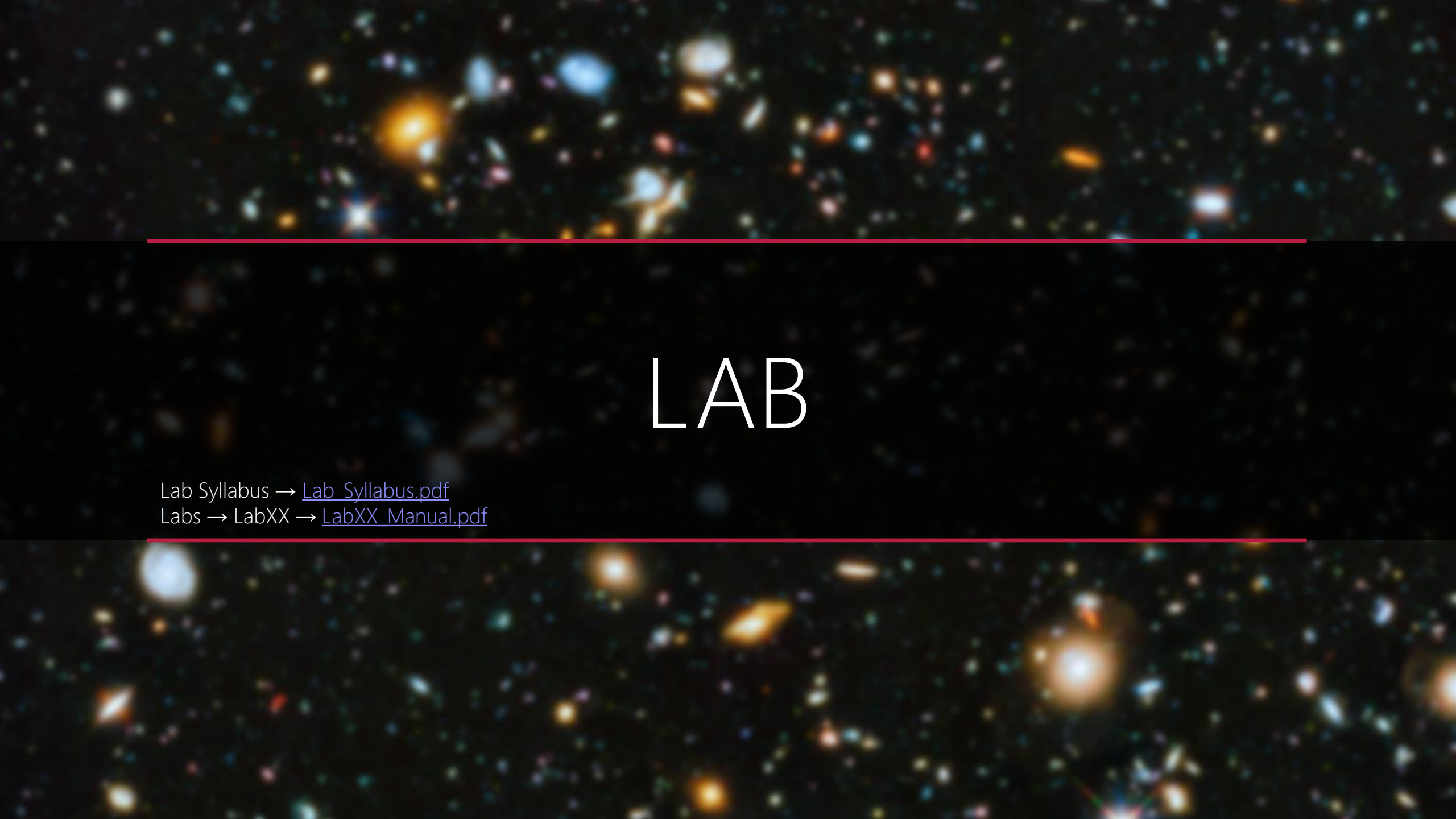
Zahra Taherikhonakdar (taherik@uwindsor.ca)
Erie Hall 1115 (Hyflex)
Morning Labs
Section 51, Tuesdays 11:30 AM - 12:50 PM
Section 52, Thursdays 11:30 AM - 12:50 PM

Roonak Moasses (moasses@uwindsor.ca)
Afternoon Labs
Erie Hall 1115 (Hyflex)
Section 53, Tuesdays 01:00 PM - 02:20 PM
Section 54, Thursdays 01:00 PM - 02:20 PM



LEC

Lectures → LecXX → LecXX_Manual.pdf



LAB

Lab Syllabus → Lab_Syllabus.pdf
Labs → LabXX → LabXX_Manual.pdf

LABROOM

aka. Laboratory

Labs → How to Attend Lab Sections

DISCUSSION BOARD

Lectures → How To Find → How to Participate in Discussion Board

Hossein Fani, PhD
Assistant Professor, School of Computer Science, Faculty of Science, University of Windsor
Room 5111, Lambton Tower
hfani@uwindsor.ca
hfani.myweb.cs.uwindsor.ca

OFFICE

Tuesday – Thursday 11:30 AM – 12:30 PM

The Bonnie Situation, Pulp Fiction (1994), Quentin Tarantino