Python level-I

开课前要把所有用到的程序运行一遍

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√

1. Familiar with your keyboard
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Familiar with your keyboard

 windows keyboard  Apple keyboard

Share Keyboard document

1. Key name

Key	Name

Key	Name
space	space, empty space in editor
Enter	return, enter, new line in editor
:	colon, key:value separator in dict
,	comma, list or tuple item separator, delimiter in csv file
.	dot, period, instance function call()
#	pound, hashtag, number, hold shift key click number 3, comments the line
`	back quote, grave accent, command block in markdown
*	asterisk, star, bullet point in markdown, math multiply operator
()	parenthesis, tuple, function definition and call
-	dash, hyphen, minus math operator, command option python --version
_	underscore, dunder function or variable, private or protected variables
{}	curly bracket, dict or set
[]	bracket, square bracket, list
\	back slash, line continue, escape sequence
/	forward slash, file name path fold dilimiter
|	pipe, virtical bar, bitwise OR operator
&	ampersand, and simple, bitwise AND operator
^	caret, circumflex, bitwise XOR operator
?	question mark, space holder in sqlit
$	dollar sign
;	semicolon

- combination keys

```
ctrl+c
Ctrl+v
ctrl+/
shift+downarrow
tab
shift+tab
```

- Command line arrow key usage

```
    upArrow: bring previous command back
    downArrow: bring next command back
    leftArrow: move cursor to left in DOS window
    rightArrow: move cursor to right in DOS window
```

- Hight light block of code
- Ctrl+c: copy
- Ctrl+v: paste
- Ctrl+/: toggle comments

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Using Markdown

- turn in homework to GitHub
- VS Code Extension
  - Markdown All in One
  - Markdown Preview Enhanced
  - Unicode LaTex
- √ Markdown md文件的制作，制作课堂笔记  好记性不如烂笔头儿
  - add Markdown Extension
  - 显示标题，子标题 #, ##
  - 显示 bullet point *，1
  - 显示命令行
  - 显示图形
  - 显示链接

 磨刀不误砍柴工

- Markdown Cheat Sheet
- Reference to pythonInstall.md
- Install Greenshot

  installation file name: Greenshot-INSTALLER-1.2.10.6-RELEASE.exe

- Basic operation

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Getting start

- install softwares needed

refer to python installation file.

- check installation

- installation check

```
python --version
git --version
code --version
```

- build working folders

```
mkdir workspace
cd workspace
mkdir python1
```

- set virtual environment

```
python3 -m venv env
source env/bin/activate
```

use text editor: NotePad.exe

```
print("Hello, world!")
a = 4
b = 5
print(a+b)
```

save to first.py

```
python first.py
```

- build virtual environment

```
python -m venv env
```

 Virtual Environment

- familiar with VSCode. VS code
- convert python script to exe

```
pip install pyinstaller
pyinstaller --onefile -w 'filename.py'
```

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print

- hello.py; getting start with Python > hello.ReadMe.md
- print.py; hello/print.py
- helloHim.py; intruduce input() function
- print-string.py;
- input.py
- guessNumber.py
- dice.py; introduce random module, dice/dice1.py
- dice2.py; figure out possibility, understand how computer do things

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Dice

- dice.py; introduce random module, dice/dice1.py
- dice2.py; figure out possibility, understand how computer do things

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Simple math

./mymath

		Built-in Functions		
abs()	delattr()	hash()	memoryview()	set()
all()	dict()	help()	min()	setattr()
any()	dir()	hex()	next()	slice()
ascii()	divmod()	id()	object()	sorted()
bin()	enumerate()	input()	oct()	staticmethod()
bool()	eval()	int()	open()	str()
breakpoint()	exec()	isinstance()	ord()	sum()
bytearray()	filter()	issubclass()	pow()	super()
bytes()	float()	iter()	print()	tuple()
callable()	format()	len()	property()	type()
chr()	frozenset()	list()	range()	vars()
classmethod()	getattr()	locals()	repr()	zip()
compile()	globals()	map()	reversed()	__import__()
complex()	hasattr()	max()	round()	

- math0.py/ built-in functions, abs(), pow(), sum(), max(), min(), round()

Square Root $$ x=\sqrt x^2=x ^ \frac 1 2 $$ $$ 4=\sqrt {16}=16 ^ \frac 1 2 $$

- math1.py; functions defined in math module, sqrt(), ceil(), floor(), sin(), cos()
- math2.py
- math2.py
- solution.py

$$ A=\pi r^2 $$, where **A** is area of a circle, **r** is radius of the circle.

- circle.py

 赶集

几个老头儿去赶集，上街买了一堆梨，一人一个多一个，一人两梨少两梨。问：几个老头儿几个梨?

- linear1.py; 老头儿们买梨。

 Chicken & Rabbits

- linear2.py
- linear3.py
- linear4.py
- linear5.py
- perfactNumber1.py
- Volumn of Sphere $$ V = \frac 4 3 \pi r^3 $$
- Volumn of Cylinder $$ V = r^2 \pi \cdot h $$
- Triangle area $$ area = \frac 1 2 (b \cdot h) $$

$$\cdots $$

- Triangular Number $$ T_n = \sum_{k=1}^n k $$

  $T(n)=\frac {n(n+1)} 2$

 Triangular Number

- solution1.py
- circle.py
- prime1.py; ./prime/prime1.py
- prime1.py ~ prim7.py; treat computer as humanbeen, do it right

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OOP

- class book, **init**, **repr**
- class student.py constructor, **repr** abstraction 

- user.py, User, SubUser inheritence testUser
- person, teacher, student inheritence 

YouTube Classes Python Classes

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Python class

```
class User:
    pass
```

- assign fields to an instance of User

Python Classes

- person.py
- bookdb.py
- create a class snowman.py > drawSnowMan.py > shapes.py
- class0.py - pass class, instance and class level attributes
- create a class snowman.py > drawSnowMan.py > shapes.py
- class1.py > dynamically assign instance attribute and access it from outside function
- class2.py > define internal function
- class3.py > **init**(self) and internal function
- class4.py > use keyword argument in **init**(self)
- class5.py > understand **str**, **repr**, and **len**()
- class6.py > protected attribute and private attribute
- class7.py > getter/setter
- class8.py; inherite from Enum
- class9.py; difference between **init** and **new**
- class10.py; override **new**() constructor
- class11.py; issue caused by class level variables
- class12.py; different object with different attributes
- class13.py; class level variables
- class14.py; define internal function by outside function, the benifit is use this outside function by more than one class.
- class15.py; function call function
- class16.py; multiple inheritance
- class17.py; reverse given string
- class18.py; define Website class
-
- personInheritance.py > inheritance
- personTest.py > understand class name <module_name>.<class_name>
- √ bookdb.py > used in app4.py

- polygon.py; ask student implement **repr**(self)
- student.py; using class level method
-

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install npm

Download and install node  Download image - windows File: node-v12.18.3-x64.msi - macos File:

- √ Install NodeJS & npm on windows 10 nodejs.org/en/  install page Google Search: install reactjs on windows 10 Step by step option 2

```
node --version
npm --version
```

- create react js application

```
npm install -g create-react-app

create-react-app --version

create-react-app reactproject2
```

- Install ReactJs on MacOS

```
sudo npx create-react-app wang-app
sudo chown -R wangqianjiang wang-app
cd wang-app
npm start
```

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ReactJS

- web application vs. window application open new VSCode window > python-gui (demo on window's machine.)

```
python calculator2.py
```

 Python Web Application

- get reactjs project from github

```
git clone https://github.com/jwang1122/reactjs.git
```

- start the application open new VSCode > ~/workspace/reactjs

```
cd server
python app.py
cd ../book-app
npm start
```

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App server

- URL: Uniform Resource Locator
    - https://www.google.com
    - Protocal: http, https, ftp ...
    - Host: www.google.com
    - Port: number followed by :, default 80 for http, 443 for https
    - Path:
    - Querystring: text after ?, key=value pair separated by &
    - Fragment: text after #(hashtag), jump to certain section in the document
- app1.py > ping-pong
- app2.py >
- app3.py > display hardcoded books
- app4.py > display books from mongodb, postman > test service
- getJson.py > load books from given website url
- bookdb.py
- Install Postman Download Website  First time run Postman
- start app4.py, test POST, UPDATE, DELETE methods

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Mongo DB

Install MongoDB

- NoSQL - MongoDB ->
    - collection
- SQL: Structured Query Language What is SQL?
- create0.py > create book and save it to mongodb
- create1.py > create more than one document at once
- retrieve0.py > retrieve one book from mongodb
- retrieve1.py > retrieve all books from mongodb
- retrieve2.py > retrieve some books based on condition from mongodb
- update.py > update one document
- delete.py > delete one document
- bookdb.py > create a class include all CRUD process.

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Function

		Built-in Functions		
abs()	delattr()	hash()	memoryview()	set()
all()	dict()	help()	min()	setattr()
any()	dir()	hex()	next()	slice()
ascii()	divmod()	id()	object()	sorted()
bin()	enumerate()	input()	oct()	staticmethod()
bool()	eval()	int()	open()	str()
breakpoint()	exec()	isinstance()	ord()	sum()
bytearray()	filter()	issubclass()	pow()	super()
bytes()	float()	iter()	print()	tuple()
callable()	format()	len()	property()	type()
chr()	frozenset()	list()	range()	vars()
classmethod()	getattr()	locals()	repr()	zip()
compile()	globals()	map()	reversed()	__import__()
complex()	hasattr()	max()	round()	

- define a function $$ \underbrace {def}*{keyword}* |*underbrace {circle _area}*{function \space name} \left(\underbrace {a, b,c ...}*{arguments}*|*right)* |*underbrace {:}*{eol} $$
- type following code in python playground.

```
def f():
    pass

dir()

f()

f
```

$$ area = \pi * r^2 $$

if you don't return value from function, you will get None when you assign the value to a variable.

- math1.py (circle area, rectangule area, triangle area)
- defineFunction.py (help(sum))
- collision.py; use / to avoid collision,
- keywordArgs.py; positional arguments first
- practice: define a function with keyword arguments
    - (createList.py parseString(str, sep=','))
- defaultValue.py
- annotation1.py; wonderful use of keyword arguments
- annotation2.py; long large function
- ask.pys
- attribute.py
- optionalPositionalArgs.py
- innerFunction0.py
- innerFUnction1.py
- homework1
- homework2

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Prime

- prime0.py > straight forward, define function
- prime1.py > optimized by half
- prime2.py > define function isPrime()
- prime3.py > calculate range(40-50)
- prime4.py > define function rangePrime(x,y)

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plot

- plot0.py
- plot1.py

- plot2.py
- plot3.py
- plot-student-csv.py
- Practice: plot sin(x) and cos(x) in the same chart > plot4.py
- China-vs-USA.py
    - Online data
    - Online data
    - [Homework] Choose different two states, plot the data
- covid-19/covid0.py
- covid-19/covid1.py
- covid-19/covid2.py

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Terminal Games

- Check homework
- roll dice
    - dice.py
    - Practice: add total value of 2 dices
    - Practice: circle.py > circle_area(r)
- guess number
    - guessNumber.py
- ball game ball10.py

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draw snow man

- Snow Couple
- demo draw_snowman.py
- shapes.py
- testShapes.py
- drawSun.py; add snow man in the picture.
- homework> draw snowcouple

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turtle

```
python -m turtledemo
```

- turtle1.py; display turtle pen
- turtle2.py; basic turtle move

- turtle3.py; mouse click on turtle
- turtle4.py; random move on click
- turtle5.py; avoid turtle move out of window
- turtle6.py; avoid turtle move out of window
- turtle7.py; display card on turtle screen
- turtle8.py; draw star
- turtle9.py; draw half circle
- shapes.py; triangle, rectangle, line, circle
- testShapes.py; test all functions defined in shapes.py
- drawSun.py; drawing a sun and house by using shapes.py
    - assign homework draw snow couple

 Snow Couple

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ball game

- ball1.py [Display a ball at center of the screen.]
- ball2.py []
- ball3.py
- ball4.py
- ball5.py
- ball6.py
- ball7.py
- ball8.py
- ball9.py
- ball10.py [Final version of ball game.]

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Loop

- forLoop1.py
- forBreak.py
- forContinue.py
- forNested1.py; print right triangle
- forNested2.py; print Equilatera triangle
- forNested3.py； print diamond
- forNested4.py; define function for n

- forElse.py
- for1.py; generator
- for2.py; more generator
- while.py
    - Practice:

```
We're on time 0
We're on time 1
We're on time 2
We're on time 3
```

    - loop string
- whileElse.py
- guessNumber.py
    - assign homework to modify guessNumber.py for two players

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If-Else

./if-else

- if-else1.py
- if-else2.py
- if-else3.py
    - Infinit loop while True: > input("Continue? (y/n)")
    - Practice:

```
2, 4, 6, 8, 10
1, 3, 5, 7, 9
```

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Data Type

-  Data Type
- python terminal
- simpleDataType.py; simple datatype, number, string, boolean

   boolean conversion
- int, float, complex > floatTest.py

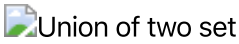
- str > strTest.py; operation on string
- tuple > tupleTest.py
- list > listTest.py

list	tuple
add data	cannot be changed
remove data	cannot be changed
change data	immutable
slow operation	made quickly

- tupleList.py
    - create a list [expr for val in collection] [expr for val in collection if]
- set > setTest.py we use set when the order and frequency of data is not matter

```
python >>>
myset = set()
dir(myset)
help(myset.add)
myset.add(1)
myset.add("hello")
myset.add(1)
```

second time use myset.add(1) will be ignored. set do not contain duplicated element.

 Union of two set

 Intersection of two set

- dict > dictTest.py

Basic date and time types

- datetime1.py; other data type (datetime.date)
- datetime2.py;
- strftime() and strptime() Format Codes

Directive	Meaning	Example
%a	Weekday as locale's abbreviated name.	Sun, Mon, ..., Sat (en_US);So, Mo, ..., Sa (de_DE)

Directive	Meaning	Example
%A	Weekday as locale’s full name.	Sunday, Monday, ..., Saturday (en_US); Sonntag, Montag, ..., Samstag (de_DE)
%w	Weekday as a decimal number, where 0 is Sunday and 6 is Saturday.	0, 1, ..., 6
%d	Day of the month as a zero-padded decimal number.	01, 02, ..., 31
%b	Month as locale’s abbreviated name.	Jan, Feb, ..., Dec (en_US); Jan, Feb, ..., Dez (de_DE)
%B	Month as locale’s full name.	January, February, ..., December (en_US); Januar, Februar, ..., Dezember (de_DE)
%m	Month as a zero-padded decimal number.	01, 02, ..., 12
%y	Year without century as a zero-padded decimal number.	00, 01, ..., 99
%Y	Year with century as a decimal number.	0001, 0002, ..., 2013, 2014, ..., 9998, 9999
%H	Hour (24-hour clock) as a zero-padded decimal number.	00, 01, ..., 23
%I	Hour (12-hour clock) as a zero-padded decimal number.	01, 02, ..., 12
%p	Locale’s equivalent of either AM or PM.	AM, PM (en_US); am, pm (de_DE)
%M	Minute as a zero-padded decimal number.	00, 01, ..., 59
%S	Second as a zero-padded decimal number.	00, 01, ..., 59
%f	Microsecond as a decimal number, zero-padded on the left.	000000, 000001, ..., 999999
%z	UTC offset in the form ±HHMM[SS[.ffffff]] (empty string if the object is naive).	(empty), +0000, -0400, +1030, +063415, -030712.345216
%Z	Time zone name (empty string if the object is naive).	(empty), UTC, GMT
%j	Day of the year as a zero-padded decimal number.	001, 002, ..., 366
%U	Week number of the year (Sunday as the first day of the week) as a zero padded decimal number. All days in a new year preceding the first Sunday are considered to be in week 0.	00, 01, ..., 53

Directive	Meaning	Example
%W	Week number of the year (Monday as the first day of the week) as a decimal number. All days in a new year preceding the first Monday are considered to be in week 0.	00, 01, ..., 53
%c	Locale's appropriate date and time representation.	Tue Aug 16 21:30:00 1988 (en_US); Di 16 Aug 21:30:00 1988 (de_DE)
%x	Locale's appropriate date representation.	08/16/88 (None); 08/16/1988 (en_US); 16.08.1988 (de_DE)
%X	Locale's appropriate time representation.	21:30:00 (en_US); 21:30:00 (de_DE)
%%	A literal '%' character.	%
%G	ISO 8601 year with century representing the year that contains the greater part of the ISO week (%V).	0001, 0002, ..., 2013, 2014, ..., 9998, 9999
%u	ISO 8601 weekday as a decimal number where 1 is Monday.	1, 2, ..., 7
%V	ISO 8601 week as a decimal number with Monday as the first day of the week. Week 01 is the week containing Jan 4.	01, 02, ..., 53

- datetime3.py; convert string to datetime by strptime(string, format)
- datetime4.py; differences between datetime, date, time

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Python playground and help document

- python >>> help(print) (positional arguments, keyword arguments)
- Practice: different print statements
- hello/print.py
- hello/print-string.py
-

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File access

Text Files	Binary Files
Plain Text, XML, HTML, JSON, Source Code, CSV	Compiled code, App data, Media files, images,audio, video

- file0.py (write to file)
- file1.py (read and write to existing file)

- file2.py (with open, auto close)
- file3.py (dump json, write to json file)
- file3a.py (read json from file)
- file3b.py (read json from string)
- file4.py (pandas read csv)
- file5.py (read csv file, and plot the data)
- file6.py (write dict to csv file)
- readJson.py
- csvReader.py

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Review

- Markdown document
- ball game
- draw snowman
- file access (read/write plain text, csv, json)
- plot
- covid_19
- debug python code
- database access (CRUD)
- Postman to test web service
- application web server
- react JS front end GUI server

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install and using QuickType

QuickType website

- QuickType Installation

```
npm install -g quicktype
quicktype --version
```

- Python code generation

```
quicktype ./data/student.json -o student.py
```

- install

```

```

```
npm intall -g quicktype
quicktype --version
```

- generate python code based on Json

```
quicktype ./data/student.json -o student.py
```

- book.py > **init**, **str**
- student.py constructor, **repr** abstraction
- user.py, User, SubUser inheritence testUser
- person, teacher, student inheritence

YouTube Classes

classes are foundmantal tools to any object oriented programing language, think of class as template for creating object and related data and functions that do interesting things with that data. Python make it easy to create classes

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Sqlite

- sqlite0.py > create connection
- sqlite1.py
- sqlite2.py
- install DB browser for SQLite

Google Search: DB Browser for Sqlite

SQLite GUI Download Website

SQLite Browser for MacOS

File: DB.Browser.for.SQLite-3.12.1-win64-v2.msi 

- sqlite4.py
- sqlite5.py
- sqlite6.py

- sqlite7.py > build relational data
- sqlite8.py > show relation between project and task

- review bookdb.py
- sqlite9.py > create books table
- sqlite10.py > insert data into books table
- sqlitebookdb.py > build CRUD
- app5.py > use sqlitebookdb.py to provide service use Postman to check the service.

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