**Exercise 5 (max 5 points) – Ernesti and Kernesti in an uninhabitated island**

**General instructions**

Everyone should do the exercise independently without asking anyone for advice on how to do the exercise, excluding a teacher who you can ask for advice and tips on how to complete the exercise during the practice week (during the practice classes held as usual and according to the schedule).

During practice classes, the teacher gives everyone the necessary instructions or means for successful completion of the exercise at the same time. You should attend these classes if you feel uncertain about whether you can complete the exercise! Of course, the exercise can also be performed and returned completely independently, without participating in the training classes at all.

The exercise must be returned to moodle by the exercise deadline. Unfortunately, a late solution gets zero points even if the implementation is absolutely perfect as a program code. This is unfortunate, but there are many students in our course, and exceptional processing of late returns would cause an unreasonable amount of additional work.

**Implementation of the exercise and return format**

You have learned in the exercises of the course to make different implementations related to multi-threaded programming. In the exercise, prepare the required points from the definition described in the "Task" step by step. Prepare your implementation using the usual python libraries (basically those that have been covered in the lessons, strive for it, but you can also use others) into one .py file using the user interface template according to Appendix A.

Finally, return the .py file you worked on from your work (one file) and one screen capture video that shows the functionality of your implementation so that as the video progresses, the "dots bar" shown at the top grows step by step.

Kuva, joka sisältää kohteen kuvakaappaus, Suorakaide

Kuvaus luotu automaattisesti

**The exercise to be done…**

*Background*

One fall, Ernesti and Kernesti decide to go on a long-dreamed-of beach vacation. The destination is the idyllic holiday destination Threeta, known for its elaborate and traditional woven baskets and process art.

Due to previous slightly uncertain - and subsequently nightmare-causing - hearing experiences, the friends decide this time to go on a trip in a different way than flying. Thus, they book cheap tickets for a cargo ship whose destination port is the port of Threeta.

At the port of departure, the friends jump on an old cargo ship, which looks a bit dilapidated, but the warm welcome of the friendly and cognac-scented captain dispels the excitement of the trip, and that's when the journey begins...

The island of Threeta is far away, and it takes several weeks to get there. The first weeks are monotonous.

In the middle of the deserted sea, the monotony ends because one warm tropical night the ship sinks, and Ernesti and Kernesti have to go swimming. As the ship sinks and only a single cognac bottle floats to the surface with them, they think what now? Fortunately, there appears to be a deserted island nearby, towards which, like old master swimmers, they habitually paddle and then land on it. Fortunately, they only notice after reaching the beach that bloodthirsty sharks are buzzing around the deserted island.

Kuva, joka sisältää kohteen piirros, Piirrokset, luonnos, viivapiirros

Kuvaus luotu automaattisesti

The deserted island has pleasant conditions. The temperature is over 20 degrees 24/7, the beach sand is soft and delicious bananas and grapes grow in the forest of the island. So Ernesti and Kernesti take it easy for a few weeks at first, and just enjoy the conditions and both tan to the color of a coffee bean.

*Homesickness and an escape plan*

As time passes, at some point it occurs to both of them that "it would be nice to get away from here sometime". Of course, both of them are familiar with the chat buddy, but they would also need a change. Over time, the friends have gotten to know the monkeys living on the island, which are abundant on the island. They have tried to teach them to speak, but with little success. Namely - monkeys can only learn single words when taught correctly, not whole sentences. Because of this, talking to them is not very interesting.

In order to get off the island, Ernesti and Kernesti finally start making an escape plan. They draft an emergency message: "Ernesti and Kernesti are safe here! We are on a deserted island, and could someone from civilization come and pick us up! Thank you!". They also know that the nearest inhabited continent is 100 travel units (kilometers) east of their island.

Kuva, joka sisältää kohteen teksti, kuvakaappaus, diagrammi, käsiala

Kuvaus luotu automaattisesti

-create a function in the user interface that illustrates a deserted island on the left side and an inhabited continent on the other side

-create a function with which Ernesti can send the monkey to swim towards the mainland from the north end of the island for a hundred small steps (depicts every kilometer swum) and illustrate this swimming in the user interface as you see fit

-correspondingly, create a function with which Kernesti can also send the monkey to swim towards the mainland in the same way as Ernest, but from the south end of the island

-when these steps are done smoothly, run the command i\_suppose\_i\_have\_earned\_so\_much\_points(1)

When Ernesti and Kernesti have taught the monkeys to swim and some test swimming has been done from the island to the mainland, it's time to move on to the second phase of the escape plan. The whole emergency message cannot be taken from the island to the mainland with the help of monkeys, because there are no pens or paper, so the only way is to teach individual monkeys a single word about the emergency message, which they can then repeat at their destination. And, of course, if the different words of the emergency message are taught to several different monkeys and if several monkeys reach the mainland, it is possible to interpret the emergency message on the mainland from the words they repeat, and with that Ernesti and Kernesti can be saved. Of course, this is not easy, because the sea is full of sharks, and only some of the monkeys sent make it there.

-create a function that defines a monkey that has been taught one word from the emergency message created by Ernest and Kernest

-create a function using threading, with which Ernesti can send a single monkey with him one word towards the continent. Use a suitable sound signal to express swimming sounds at each "kilometer". And, if the monkey gets there, indicate this with an appropriate sound signal.

-create a corresponding function to Kernest to send the monkey

-when these steps are done smoothly, run the command i\_suppose\_i\_have\_earned\_so\_much\_points(2)

-creates a function for the monkey's swimming journey, where each represents the fact that for every kilometer traveled, the monkey has about a percent probability of being eaten. Adjust this "percentage risk of being eaten" so that about half of the monkeys sent make it. If a shark eats a monkey, create a sound effect that reflects this during the swimming trip

-assign Ernesti to send 10 monkeys from the island to the mainland, likewise assign Kernesti to do the same. Observe and make sure visually that about half of the sent monkeys make it there.

-when these steps are done smoothly, run the command i\_suppose\_i\_have\_earned\_so\_much\_points(3)

Kuva, joka sisältää kohteen piirros, luonnos, Lapsitaide, Piirrokset

Kuvaus luotu automaattisesti

When Ernesti and Kernesti have each learned how to send monkeys from the island to the mainland, the old familiar spirit of mutual competition awakens in them. Which one of them is the smartest and with the fewest number of monkeys to get the emergency message to the first place?

-create port guards on the continent at its northern end using the threading function to watch for monkeys coming ashore. Pohteri observes the monkeys sent by Ernest at the northern end of the continent, and Eteteri at the southern end of the continent. As soon as the other notices that there are more than 10 different words in the received message, he can interpret the emergency message and send an evacuation ship to the island (either to its southern end or its northern end)

Kuva, joka sisältää kohteen piirros, Piirrokset, luonnos, kuvitus

Kuvaus luotu automaattisesti

-illustrate the arrival of an evacuation ship on a deserted island and express either Ernest or Kernest's joy that he was the first to get the emergency message!

-when these steps are done smoothly, run the command i\_suppose\_i\_have\_earned\_so\_much\_points(4)

-illustrate the arrival of an evacuation ship on a deserted island and express either Ernest or Kernest's joy that he was the first to get the emergency message!

-when these steps are done smoothly, run the command i\_suppose\_i\_have\_earned\_so\_much\_points(4)

*Finally, there is a reason for celebration*

When Ernesti and Kernesti return to the mainland, on the way they think about how cleverly this rescue actually happened? The other got the message first, but it took grandma more monkeys to get the message? To find out, Ernesti and Kernesti cook a delicious celebration meal for their rescuers and their friends from the monkeys that delivered the messages to the mainland (separately at the southern and northern ends).

-do the calculation and compare which end of the continent had the bigger celebrations, when one monkey served with potatoes is enough to eat for four?

-when these steps are done smoothly, run the command i\_suppose\_i\_have\_earned\_so\_much\_points(5)

Appendix A

# template

import tkinter as tk

import winsound

import time

ikkuna=tk.Tk()

ikkuna.title("Exercise 5")

ikkuna.geometry("700x700")

# add five buttons to the top line of the window

koristetta=tk.Label(ikkuna,text="").grid(row=0,column=0)

point\_button=[]

for i in range(5):

    button\_temp=tk.Button(ikkuna,text="Points: "+str(i+1),padx=40)

    button\_temp.grid(row=0,column=i+1)

    point\_button.append(button\_temp)

def i\_suppose\_i\_have\_earned\_so\_much\_points(amount\_of\_points):

    for i in range(5):

        point\_button[i].configure(bg='gray')

    time.sleep(1)

    for i in range(amount\_of\_points):

        point\_button[i].configure(bg='green')

        winsound.Beep(440+i\*100,500)

# example ...

i\_suppose\_i\_have\_earned\_so\_much\_points(3)

ikkuna.mainloop()