



# PROGRAMMING IN PYTHON

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Course 10

# SOCKETS

Sockets are implemented through **socket** module in Python.

A socket object in Python has the same functions as a normal socket from C/C++: accept, bind, close, connect, listen, recv, send, ...

Besides this several other functions are available for domain translation, time outs, etc

Documentation for Python socket module can be found on:

- Python 3: <https://docs.python.org/3/library/socket.html>

# SOCKETS

How to build a simple server/client in Python:

Python 3.x (Server)

```
import socket
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.bind(("127.0.0.1", 1234))
s.listen(1)
(connection, address) = s.accept()
print ("Connectd address:", address);
while True:
    data = connection.recv(100).decode("UTF-8")
    if not data: break
    print("Received: ", data)
    if "exit" in data: break
connection.close()
print ("Server closed")
```

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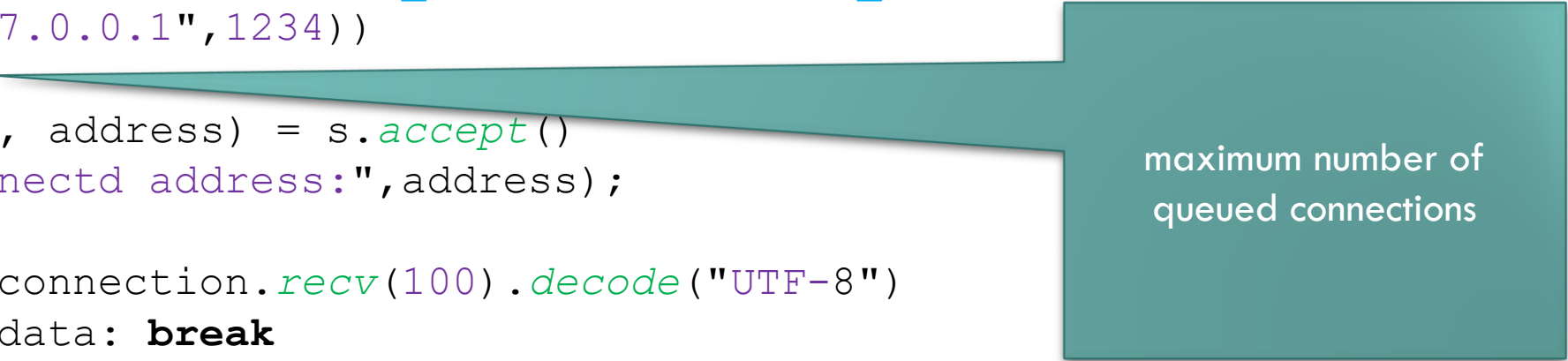
Address and port

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maximum number of  
queued connections

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```



Number of bytes to read

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s.bind(("127.0.0.1", 1234))
s.listen(1)
(connection, address) = s.accept()
print ("Connected address:", address);
while True:
    data = connection.recv(100).decode("UTF-8")
    if not data: break
    print("Received: ", data)
    if "exit" in data: break
connection.close()
print ("Server closed")
```

Use .decode("UTF-8") to convert a byte array to a string. Encoding in this case is done with UTF-8

# SOCKETS

How to build a simple server/client in Python:

Python 3.x (Client)

```
import socket, time

s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(("127.0.0.1", 1234))
s.send(b"Mesaj 1")
time.sleep(1)
s.send(b"Mesaj 2")
time.sleep(1)
s.send(b"exit")
s.close()
```

## Output from the server

```
Connectd address: ('127.0.0.1', 61266)
Received: Mesaj 1
Received: Mesaj 2
Received: exit
Server closed
```



# SOCKETS

## Getting current system IP

Python 3.x

```
import socket
print (socket.gethostbyname(socket.gethostname()))
```

## Convert a host to an IP:

Python 3.x

```
import socket
print (socket.gethostbyname('uaic.ro'))
```

Output

85.122.16.23

## Getting the name associated with an IP:

Python 3.x

```
import socket
print (socket.gethostbyaddr("85.122.16.7"))
```

Output

('jad.uaic.ro', [],  
['85.122.16.7'])

# SOCKETS

Checking if a port is open:

Python 3.x (Client)

```
import socket

ip = "127.0.0.1"
ports = [20, 21, 23, 25, 80, 443, 530, 8080]
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.settimeout(3) #3 seconds timeout
for port in ports:
    if s.connect_ex((ip, port)) == 0:
        print("Port ",port," is open")
    else:
        print("Port ",port," is closed")
```

`connect_ex` returns an error code if the connection is not possible. **0** means no error.

# URL MODULES

Python has several implementation for accessing the content of a URL.

These modules work in a similar way as **wget** or **curl** utilities (allowing one to download the content of a web page).

These are very useful for creating crawlers or scrappers.

- Python 3: <https://docs.python.org/3/library/urllib.html#module-urllib>

# URLLIB MODULE

The following code extracts the name of the dean of our faculty.

Python 3.x

```
import urllib
from urllib import request
urlManagement = 'http://www.info.uaic.ro/bin/Structure/Management'

try:
    response = urllib.request.urlopen(urlManagement).read()
    text = response.decode("utf-8")
    dn = text.split("class=strong>Decan</strong>:",1)[1].split("</span>",1)[0]
    dean_name = dn.split("wikilink>",1)[1]
    print ("Our dean is : ",dean_name)
except Exception as e:
    print ("Error -> ",e)
```

# FTP MODULE

Python has a module (ftplib) develop to enable working with FTP servers:

- Retrieve and store files
- Enumerate files from an FTP server
- Create folder on the FTP Server
- Support for password protected servers
- Support for custom FTP commands

## Documentation

- Python 3: <https://docs.python.org/3/library/ftplib.html>

# FTP MODULE

The following snippet lists all directories from [ftp.debian.org](http://ftp.debian.org) from folder debian.

Python 3.x

```
from ftplib import FTP
#drwxr-sr-x    18 1176      1176          4096 Sep 17 09:55 dists
def parse_line(line):
    if line.startswith("d"):
        print (line.rsplit(" ",1)[1])
try:
    client = FTP("ftp.debian.org")
    res = client.login()
    print (res)
    client.retrlines("LIST /debian/",parse_line)
    client.quit()
except Exception as e:
    print (e)
```

## Output

```
230 Login successful.
dists
doc
indices
pool
project
tools
zzz-dists
```

# FTP MODULE

The following snippet downloads a file from a FTS server.

Python 3.x

```
from ftplib import FTP

cmdToDownload = "RETR /debian/extrfiles"
try:
    client = FTP("ftp.debian.org")
    res = client.login()
    f = open("debian_extrfiles", "wb")
    client.retrbinary(cmdToDownload , lambda buf: f.write(buf))
    f.close()
    client.quit()
except Exception as e:
    print (e)
```

# FTP MODULE

List of all supported FTP commands:

Command	Description
FTP.connect	Connect to a specified host on a specified port (default is 21)
FTP.login	Specifies the user name and password for ftp login
FTP.retrlines	Send a command to the FTP server and retrieves the results. The result is send line by line to a callback function
FTP.storbinary	Stores a file in a binary mode on the FTP server
FTP.retrbinary	Retrieves a binary file from the server. A callback must be provided to write the binary content.
FTP.rename	Rename a file/folder from the server
FTP.delete	Deletes a file from the server
FTP.rmd	Deletes a folder from the server.



# SMTP MODULE

Python has a module (smtp) develop to enable working with emails.

While for simple emails (a subject and a text) the smtp module is enough, for more complex emails (attachment, etc) there is also another module (email.mime) that can be use to create an email.

## Documentation

- Python 3: <https://docs.python.org/3/library/smtplib.html>
- Python 3: <https://docs.python.org/3/library/email.mime.html>

# SMTP MODULE

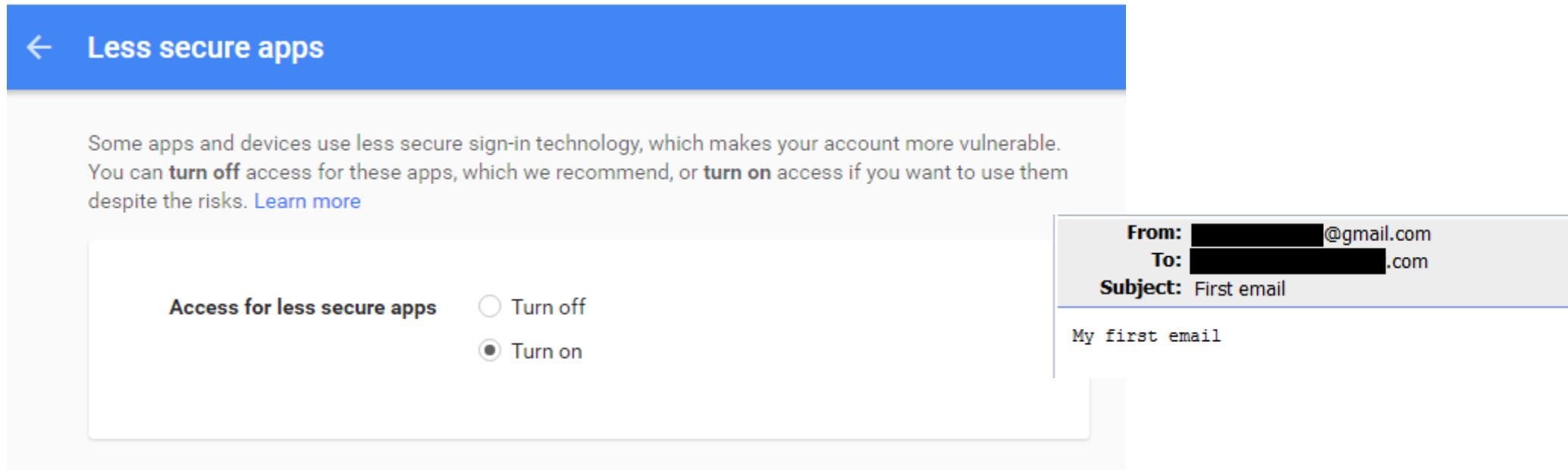
The following can be used to send an email.

Python 3.x

```
import smtplib
from email.mime.text import MIMEText
mail = smtplib.SMTP('smtp.gmail.com', 587)
mail.ehlo()
mail.starttls()
mail.login("<user_name>@gmail.com", "<Password>")
msg = MIMEText("My first email")
msg['Subject'] = "First email"
msg['From'] = "<user_name>@gmail.com"
msg['To'] = "<recipient email address>"
mail.sendmail("<from>", "<to>", msg.as_string())
mail.quit()
```

# SMTP MODULE

For the previous snippet to work with gmail servers you need to activate “Access for less secure apps” from you google account (<https://www.google.com/settings/security/lesssecureapps> )



# SMTP MODULE

## Sending multiple attachments.

Python 3.x

```
import smtplib
from email.mime.multipart import MIMEMultipart
from email.mime.image import MIMEImage
mail = smtplib.SMTP('smtp.gmail.com', 587)
mail.ehlo()
mail.starttls()
mail.login("<user_name>@gmail.com", "<Password>")
msg = MIMEMultipart ()
msg['Subject'] = "First email"
msg['From'] = "<user_name>@gmail.com"
msg['To'] = "<recipient email address>"
msg.attach(MIMEImage(open("image.png", "rb").read()))
msg.attach(MIMEImage(open("image2.png", "rb").read()))
mail.send_message(msg)
mail.quit()
```

# SMTP MODULE (ATTACHMENTS + BODY)

Python 3.x

```
import smtplib
from email.mime.multipart import MIMEMultipart
from email.mime.image import MIMEImage
from email.mime.text import MIMEText
mail = smtplib.SMTP('smtp.gmail.com', 587)
mail.ehlo()
mail.starttls()
mail.login("<user_name>@gmail.com", "<Password>")
msg = MIMEMultipart("mixed")
msg['Subject'] = "First email"
msg['From'] = "<user_name>@gmail.com"
msg['To'] = "<recipient email address>"
msg.attach(MIMEText("The body of the email", 'plain'))
msg.attach(MIMEImage(open("image.png", "rb").read()))
mail.send_message(msg)
mail.quit()
```

# BUILDING A SIMPLE HTTP SERVER

Python has some build in modules that can simulate a http server.

Python 3.x

```
from http.server import HTTPServer
from http.server import SimpleHTTPRequestHandler

httpd = HTTPServer(('127.0.0.1', 8000), SimpleHTTPRequestHandler)
httpd.serve_forever()
```

This script will create a HTTP server that listens on port 8000. If a file named “index.html” exists near the python script, it’s content will be server when 127.0.0.1:8000 is accessed from the browser.

We will discuss more about these servers after we learn about classes.

# BUILDING A SIMPLE HTTP SERVER

The default behavior for such a server is to produce a directory listing for the root where the script is.

However, if within the root a `index.html` file is found, that file will be loaded and send to the client.

These modules can also be executed automatically from the command line as follows:

- Python 3: **`python -m http.server 9000`**

The last parameter from the command line is the port number.