

# Digitalna obrada signala (13E043DOS)

## Uputstvo za instalaciju softvera

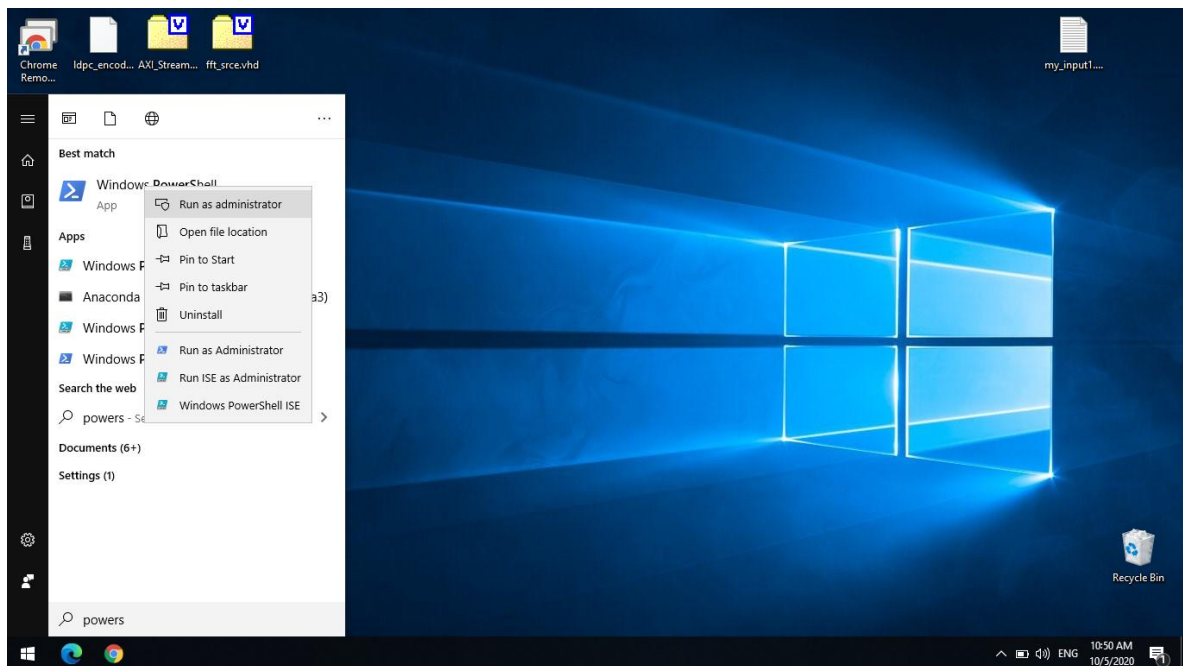
### 1. Uvod

Pajton najbolje radi pod Linux operativnim sistemom. Zato ćemo na kursu koristiti Linux. Ukoliko imate instaliran Ubuntu 18.04 ili neku drugu distribuciju, najverovatnije je dovoljno da preskočite sve korake do koraka 4. Jedino je potrebno kopirati sadržaj direktorijuma *shell\_scripts* koji ide uz ovo uputstvo u home direktorijum. Po završetku instalacije, skripte možete obrisati.

Ukoliko koristite Windows operativni sistem, evo preporuke kako da instalirate Linux uz Windows. Jedna opcija (preporučena) je da instalirate Linux na Windows Subsystem for Linux (WSL) compatibility layer-u. Ako se odlučite za ovu opciju idite na korak 2. Druga opcija je da instalirate virtualnu mašinu. U tom slučaju, preskočite korak 2 i odmah idite na korak 3.

### 2. Instalacija Ubuntu-a na Windowsu

1. Najpre je potrebno dozvoliti Windows Subsystem for Linux. Pokrenuti PowerShell sa administratorskim privilegijama (u search možete samo kucati powershell) kao na slici:



2. Otkucati sledeću komandu i sačekati da se sve operacije završe:  
`dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart`

```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

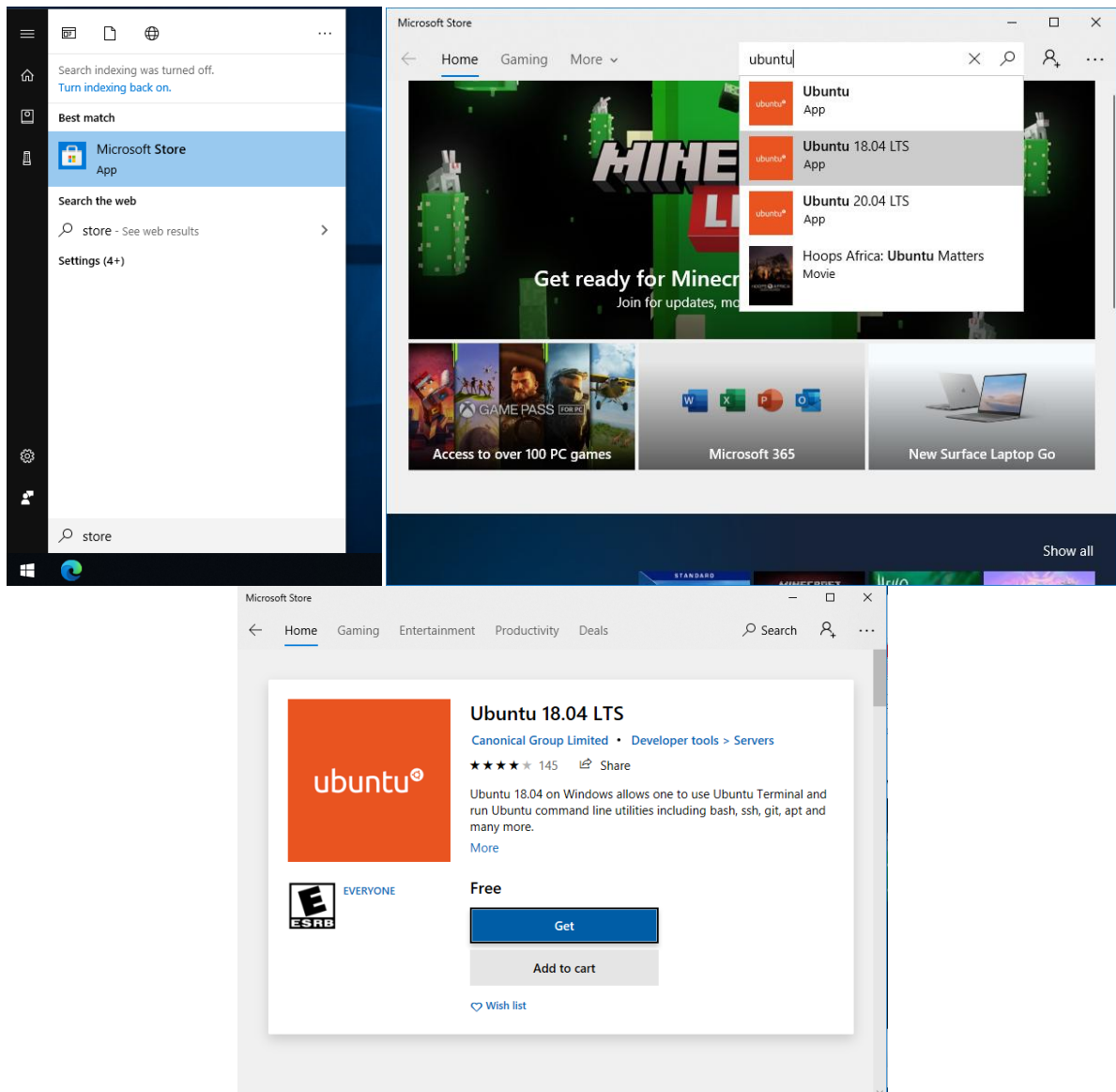
PS C:\WINDOWS\system32> dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart

Deployment Image Servicing and Management tool
Version: 10.0.17134.1550

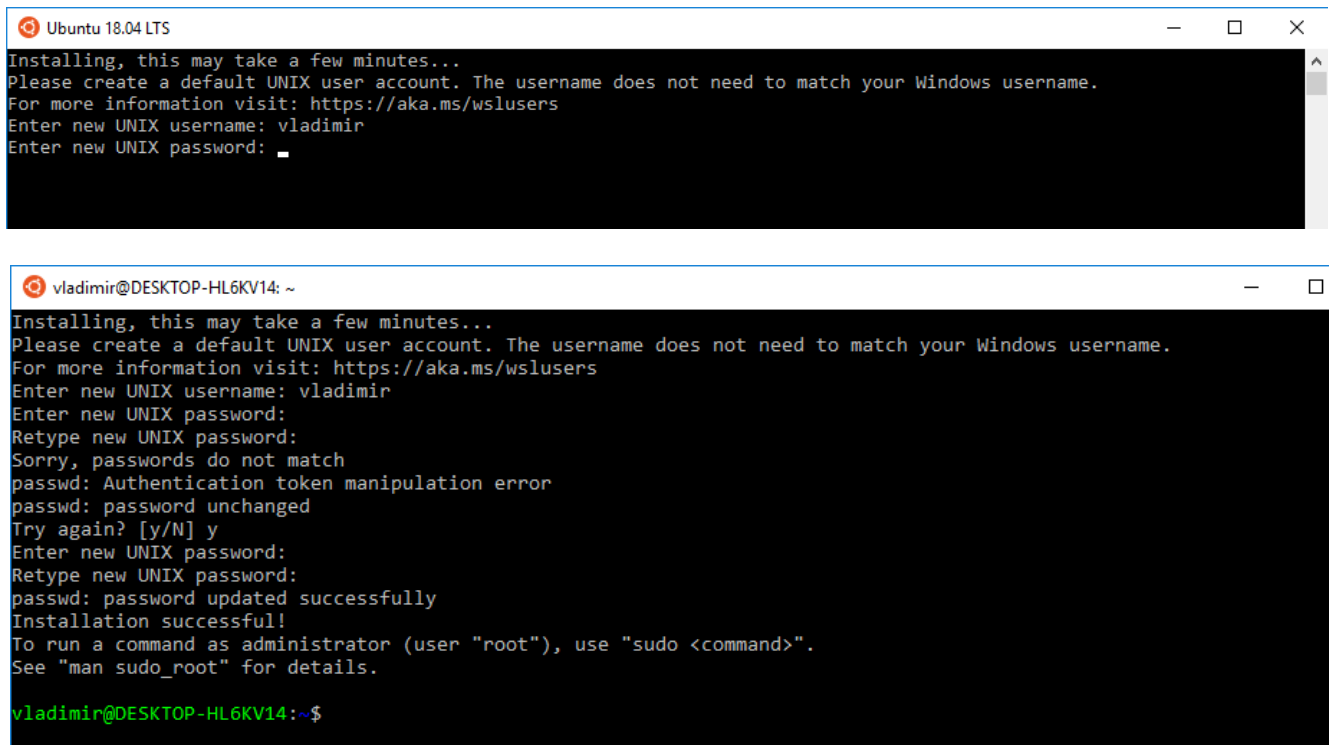
Image Version: 10.0.17134.1726

Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
PS C:\WINDOWS\system32>
```

3. Restartovati računar i sačekati da se potrebni *update*-i instaliraju.
4. Sada je WSL instaliran i na njemu se može instalirati Ubuntu. Pokrenuti Microsoft Store i instalirati Ubuntu 18.04.



5. Nakon uspešne instalacije Ubuntu se može pokrenuti kao program iz Start menija. Ostaje da se podese korisnički parametri (user name i password). Korisničko ime treba da bude napisano malim slovima, bez razmaka. Alat će tražiti da se šifra unese dva puta, pa ako drugi put pogrešite, tražiće ponovni unos.



```
Ubuntu 18.04 LTS
Installing, this may take a few minutes...
Please create a default UNIX user account. The username does not need to match your Windows username.
For more information visit: https://aka.ms/wslusers
Enter new UNIX username: vladimir
Enter new UNIX password:

vladimir@DESKTOP-HL6KV14: ~
Installing, this may take a few minutes...
Please create a default UNIX user account. The username does not need to match your Windows username.
For more information visit: https://aka.ms/wslusers
Enter new UNIX username: vladimir
Enter new UNIX password:
Retype new UNIX password:
Sorry, passwords do not match
passwd: Authentication token manipulation error
passwd: password unchanged
Try again? [y/N] y
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Installation successful!
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

vladimir@DESKTOP-HL6KV14:~$
```

6. Instalirani Ubuntu operativni sistem nema grafički korisnički interfejs. On se posebno instalira, ali nama nije potreban jer samo koristimo opcije Ubuntu-a na Windows-u. Ostaje još da mapiramo home direktorijum na *drive* sa posebnim slovom u Windows-u kako bismo lako mogli da razmenjujemo fajlove i pristupamo fajl sistemu Linux-a. Da bismo ovo uradili potrebno je da pronađemo lokaciju fajl sistema. Ona se nalazi na lokaciji:

**C:\Users\Korisnik\AppData\Local\Packages\CanonicalGroupLimited.Ubuntu18.04onWindows\_79rhkp1fndgsc\LocalState\rootfs\home\vladimir**

Moguće je da se pojedina slova razlikuju od računara do računara, zato treba pratiti putanju i otvoriti home direktorijum na svakom računaru pojedinačno. Treba obratiti pažnju da je App Data hidden direktoijum.

Home direktorijumu ćemo dodeliti *drive* u Windowsu kako bismo mu lako pristupali. Otvoriti fajl *driveLetter.bat* koji prati ovo uputstvo u tekstualnom editor i kopirati odgovarajuću putanju do home direktorijuma umesto putanje koja već stoji u fajlu. Ovaj .bat fajl iskopirati u Startup direktorijum kome se pristupa na sledeći način:

Na tastaturi pritisnuti **Windows logo + R**, zatim otkucati **shell:startup** i kliknuti OK.

Na ovaj način će se pri svakom pokretanju računara otvoriti novi drive sa slovom P: u kome je home direktorijum Linux-a. Nije potrebno restartovati računar da bi se otvorio drajv, dovoljan je samo dupli klik na *driveLetter.bat* skriptu.

7. Iskopirati sadržaj direktorijuma shell\_scripts u home direktorijum.

8. Moguće je da će iskopirani fajlovi biti bez privilegija za čitanje kao u sledećem primeru. U tom slučaju, izvršiti komandu:

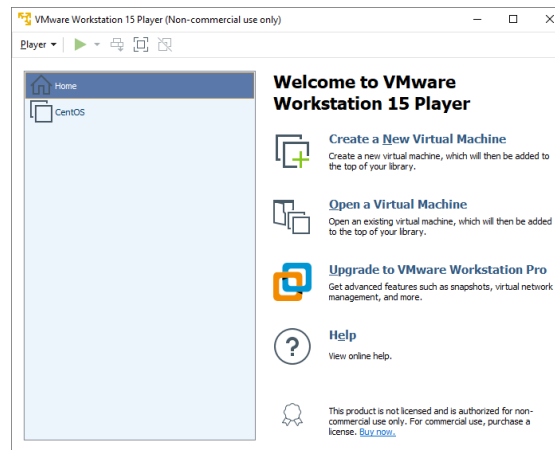
```
sudo chmod 644 startNewVenv.sh oe3dosRequirements.txt runJupyter.sh latexForJupyter.sh
```

```
vladimir@DESKTOP-HL6KV14: ~  
Installation successful!  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
vladimir@DESKTOP-HL6KV14:~$ ll  
total 16  
drwxr-xr-x 1 vladimir vladimir 4096 Oct  5 11:08 ./  
drwxr-xr-x 1 root      root      4096 Oct  5 11:06 ../  
-rw-r--r-- 1 vladimir vladimir  220 Oct  5 11:06 .bash_logout  
-rw-r--r-- 1 vladimir vladimir 3771 Oct  5 11:06 .bashrc  
drwxrwxrwx 1 vladimir vladimir 4096 Oct  5 11:08 .cache/  
drwx----- 1 vladimir vladimir 4096 Oct  5 11:08 .config/  
-rw-r--r-- 1 vladimir vladimir  807 Oct  5 11:06 .profile  
----- 1 vladimir vladimir  131 Sep 25 17:08 latexForJupyter.sh  
----- 1 vladimir vladimir 1183 Sep 25 15:34 oe3dosRequirements.txt  
----- 1 vladimir vladimir   37 Sep  8 10:55 runJupyter.sh  
----- 1 vladimir vladimir  666 Sep 25 15:36 startNewVenv.sh  
vladimir@DESKTOP-HL6KV14:~$ source startNewVenv.sh oe3dos  
-bash: startNewVenv.sh: Permission denied  
vladimir@DESKTOP-HL6KV14:~$ sudo chmod 644 startNewVenv.sh oe3dosRequirements.txt r  
unJupyter.sh latexForJupyter.sh  
[sudo] password for vladimir:  
vladimir@DESKTOP-HL6KV14:~$ ll  
total 16  
drwxr-xr-x 1 vladimir vladimir 4096 Oct  5 11:33 ./  
drwxr-xr-x 1 root      root      4096 Oct  5 11:06 ../  
-rw-r--r-- 1 vladimir vladimir  220 Oct  5 11:06 .bash_logout  
-rw-r--r-- 1 vladimir vladimir 3771 Oct  5 11:06 .bashrc  
drwxrwxrwx 1 vladimir vladimir 4096 Oct  5 11:08 .cache/  
drwx----- 1 vladimir vladimir 4096 Oct  5 11:08 .config/  
-rw-r--r-- 1 vladimir vladimir  807 Oct  5 11:06 .profile  
-rw-r--r-- 1 vladimir vladimir    0 Oct  5 11:33 .sudo_as_admin_successful  
-rw-r--r-- 1 vladimir vladimir  131 Sep 25 17:08 latexForJupyter.sh  
-rw-r--r-- 1 vladimir vladimir 1183 Sep 25 15:34 oe3dosRequirements.txt  
-rw-r--r-- 1 vladimir vladimir   37 Sep  8 10:55 runJupyter.sh  
-rw-r--r-- 1 vladimir vladimir  666 Sep 25 15:36 startNewVenv.sh  
vladimir@DESKTOP-HL6KV14:~$ source startNewVenv.sh oe3dos  
Hit:1 http://archive.ubuntu.com/ubuntu bionic InRelease  
Get:2 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]  
Get:3 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]  
Get:4 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]  
Get:5 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [8570 kB]  
Get:6 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [1354 k
```

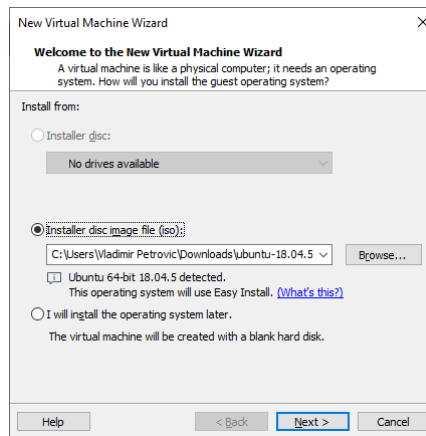
9. Sada smo spremni za instalaciju Pajtona. Pređite na korak 4.

### 3. Instalacija virtualne mašine

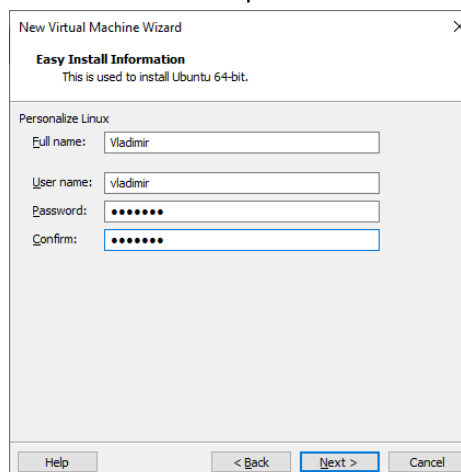
1. Instalirati najnoviju verziju VMware Workstation Player-a, dostupnu na linku: <https://www.vmware.com/products/workstation-player/workstation-player-evaluation.html>
2. Skinuti .iso fajl za instalaciju Ubuntu 18.04 operativnog sistema sa sledećeg linka: <https://releases.ubuntu.com/18.04/ubuntu-18.04.5-desktop-amd64.iso>
3. Otvoriti VMware Workstation Player i kliknuti na *Create a New Virtual Machine*



4. Odabrati .iso fajl za Ubuntu

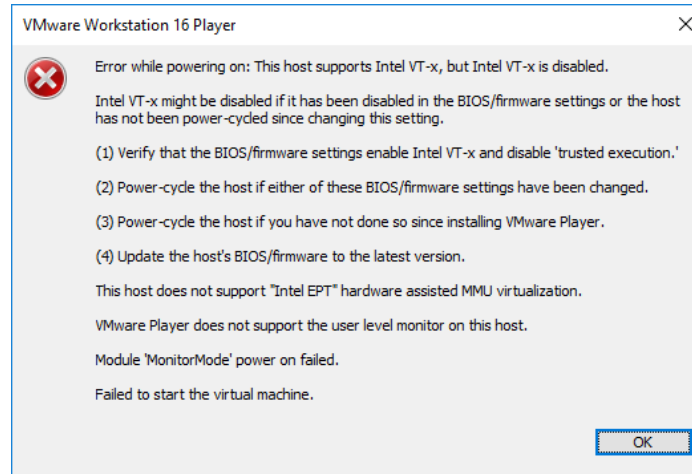


5. Odabrati podatke. Voditi računa da User name bude napisan samo malim slovima i bez razmaka.

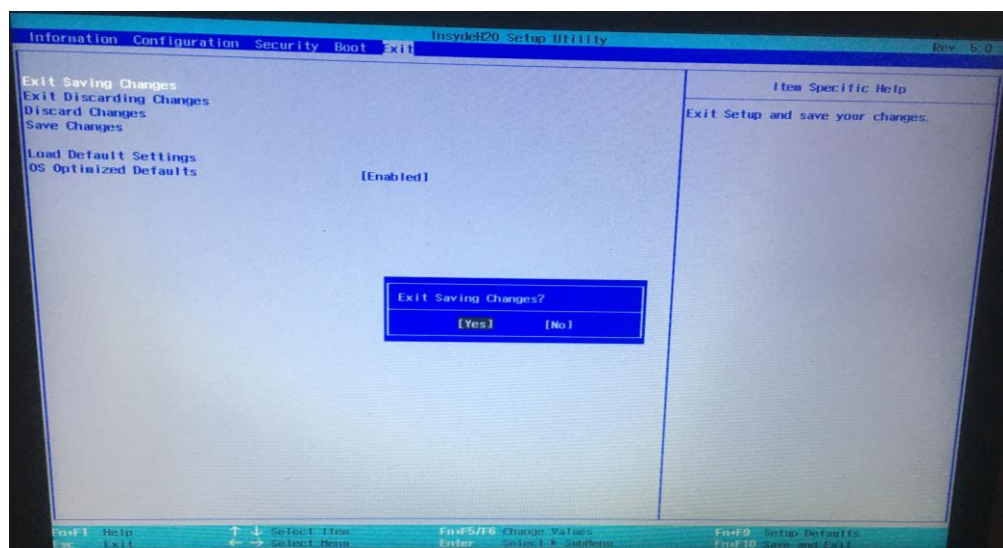
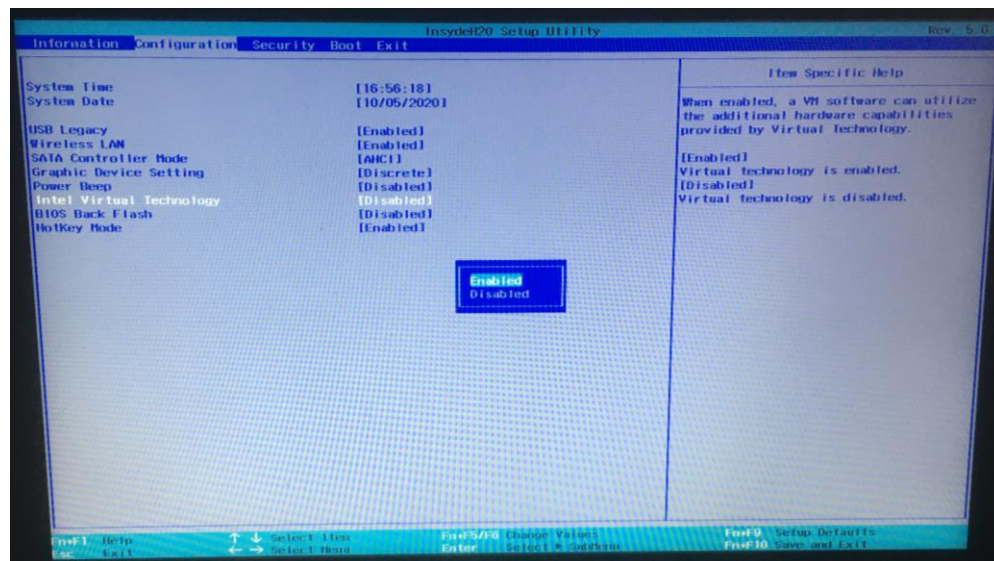


6. Next, Next, Finish
7. Postoji mogućnost da se pri pokretanju virtualne mašine pojavi sledeća greška:





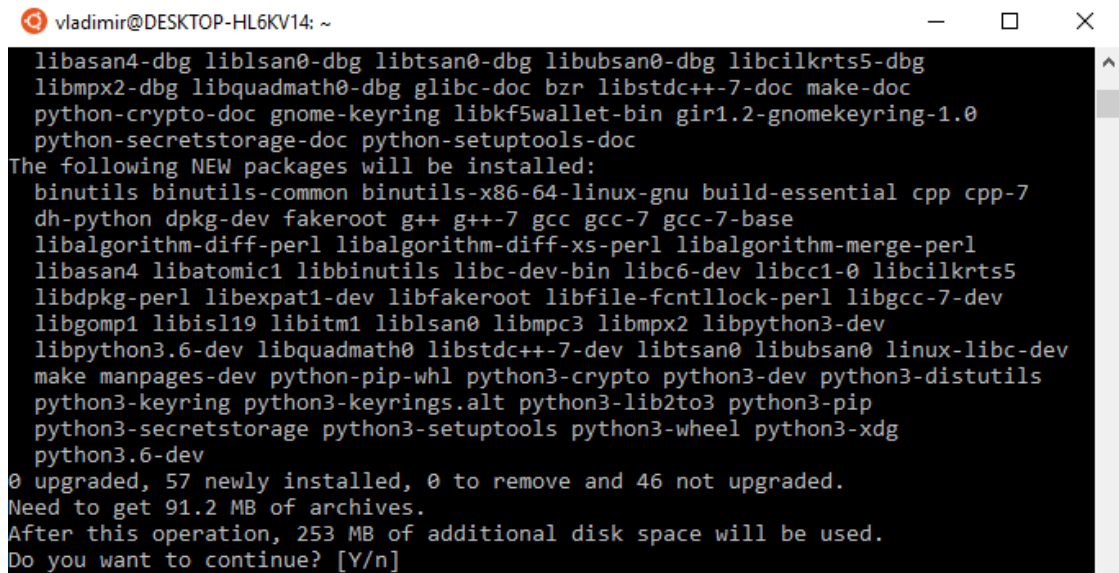
8. U tom slučaju, restartovati računar, ući u BIOS i uključiti Virtualization Technology. Primer sa Lenovo ideapad 100 laptopa je prikazan na slikama:



9. Pokrenuti virtualnu mašinu i sačekati da se završi instalacija operativnog sistema.
10. Kopirati sadržaj direktorijuma shell\_scripts u home direktorijum i pokrenuti terminal iz home direktorijuma .

## 4. Instalacija Pajtona i pokretanje Jupyter Notebook-a

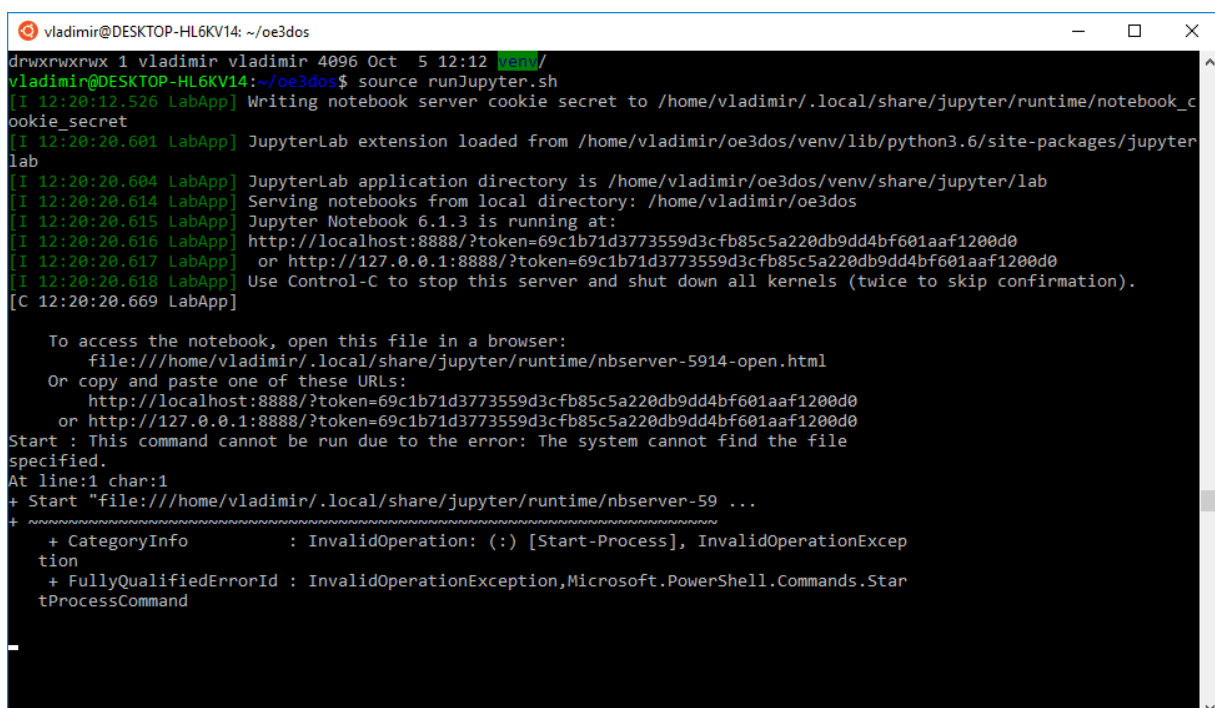
1. Ako već nije otvoren, otvoriti terminal u home direktorijumu, na primer: /home/vladimir.
2. Pokrenuti instalaciju pokretanjem skripte koja će instalirati sve potrebne alate sledećom komandom:  
`source startNewVenv.sh oe3dos`
3. Instalacija će verovatno pitati da li ste sigurni da želite da instalirate neke pakete, kao na slici. naravno da jeste, pa samo pritisnite Enter.



```
vladimir@DESKTOP-HL6KV14: ~  
libasan4-dbg liblsan0-dbg libtsan0-dbg libubsan0-dbg libcilkrts5-dbg  
libmpx2-dbg libquadmath0-dbg glibc-doc bzip2 libstdc++-7-doc make-doc  
python-crypto-doc gnome-keyring libkf5wallet-bin gir1.2-gnomekeyring-1.0  
python-secretstorage-doc python-setuptools-doc  
The following NEW packages will be installed:  
binutils binutils-common binutils-x86-64-linux-gnu build-essential cpp cpp-7  
dh-python dpkg-dev fakeroot g++ g++-7 gcc gcc-7 gcc-7-base  
libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl  
libasan4 libatomic1 libbinutils libc-dev-bin libc6-dev libcc1-0 libcilkrts5  
libdpkg-perl libexpat1-dev libfakeroot libfile-fcntllock-perl libgcc-7-dev  
libgomp1 libisl19 libitm1 liblsan0 libmpc3 libmpx2 libpython3-dev  
libpython3.6-dev libquadmath0 libstdc++-7-dev libtsan0 libubsan0 linux-libc-dev  
make manpages-dev python-pip-whl python3-crypto python3-dev python3-distutils  
python3-keyring python3-keyrings.alt python3-lib2to3 python3-pip  
python3-secretstorage python3-setuptools python3-wheel python3-xdg  
python3.6-dev  
0 upgraded, 57 newly installed, 0 to remove and 46 not upgraded.  
Need to get 91.2 MB of archives.  
After this operation, 253 MB of additional disk space will be used.  
Do you want to continue? [Y/n]
```

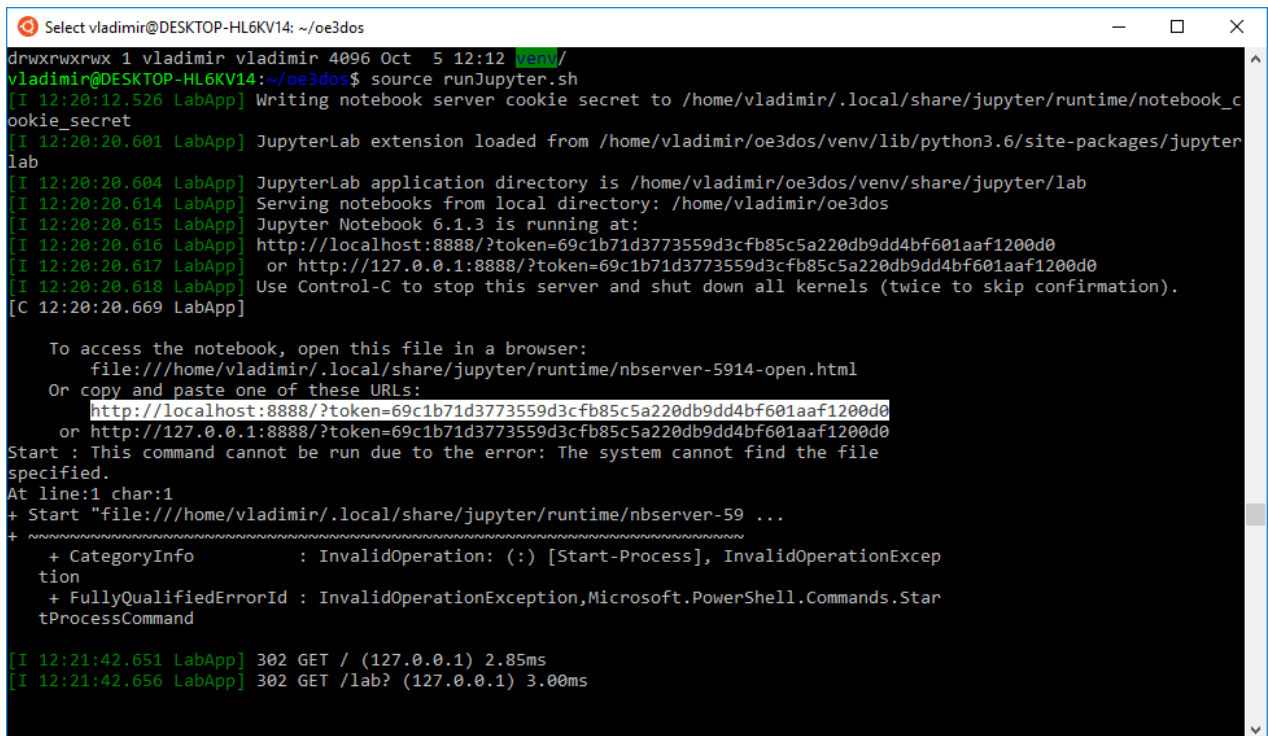
4. Sačekajte, sačekajte, sačekajte.  
Nakon instalacije kreiraće se virtualno okruženje za Pajton u kome su instalirani svi potrebni paketi. Skripta će vas takođe prebaciti u oe3dos direktorijum u kome preporučujemo da radite stvari vezane za ovaj predmet.

5. Pokrenite Jupyter server sledećom komandom:  
`source runJupyter.sh`



```
vladimir@DESKTOP-HL6KV14: ~/oe3dos  
drwxrwxrwx 1 vladimir vladimir 4096 Oct 5 12:12 venv/  
vladimir@DESKTOP-HL6KV14: ~/oe3dos$ source runJupyter.sh  
[I 12:20:12.526 LabApp] Writing notebook server cookie secret to /home/vladimir/.local/share/jupyter/runtime/notebook_cookie_secret  
[I 12:20:20.601 LabApp] JupyterLab extension loaded from /home/vladimir/oe3dos/venv/lib/python3.6/site-packages/jupyterlab  
[I 12:20:20.604 LabApp] JupyterLab application directory is /home/vladimir/oe3dos/venv/share/jupyter/lab  
[I 12:20:20.614 LabApp] Serving notebooks from local directory: /home/vladimir/oe3dos  
[I 12:20:20.615 LabApp] Jupyter Notebook 6.1.3 is running at:  
[I 12:20:20.616 LabApp] http://localhost:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0  
[I 12:20:20.617 LabApp] or http://127.0.0.1:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0  
[I 12:20:20.618 LabApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).  
[C 12:20:20.669 LabApp]  
  
To access the notebook, open this file in a browser:  
file:///home/vladimir/.local/share/jupyter/runtime/nbserver-5914-open.html  
Or copy and paste one of these URLs:  
http://localhost:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0  
or http://127.0.0.1:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0  
Start : This command cannot be run due to the error: The system cannot find the file specified.  
At line:1 char:1  
+ Start "file:///home/vladimir/.local/share/jupyter/runtime/nbserver-59 ...  
+ ~~~~~  
+ CategoryInfo          : InvalidOperation: (:) [Start-Process], InvalidOperationException  
+ FullyQualifiedErrorId : InvalidOperationException,Microsoft.PowerShell.Commands.StartProcessCommand
```

6. Otvorite web browser i u adresu uneti <http://localhost:8888> . Za prvo pokretanje je potrebno uneti adresu koja je dopunjena bezbednosnim tokenom. Selektujte, dakle celu adresu, desni klik i paste u browser. Adresa je označena na slici:

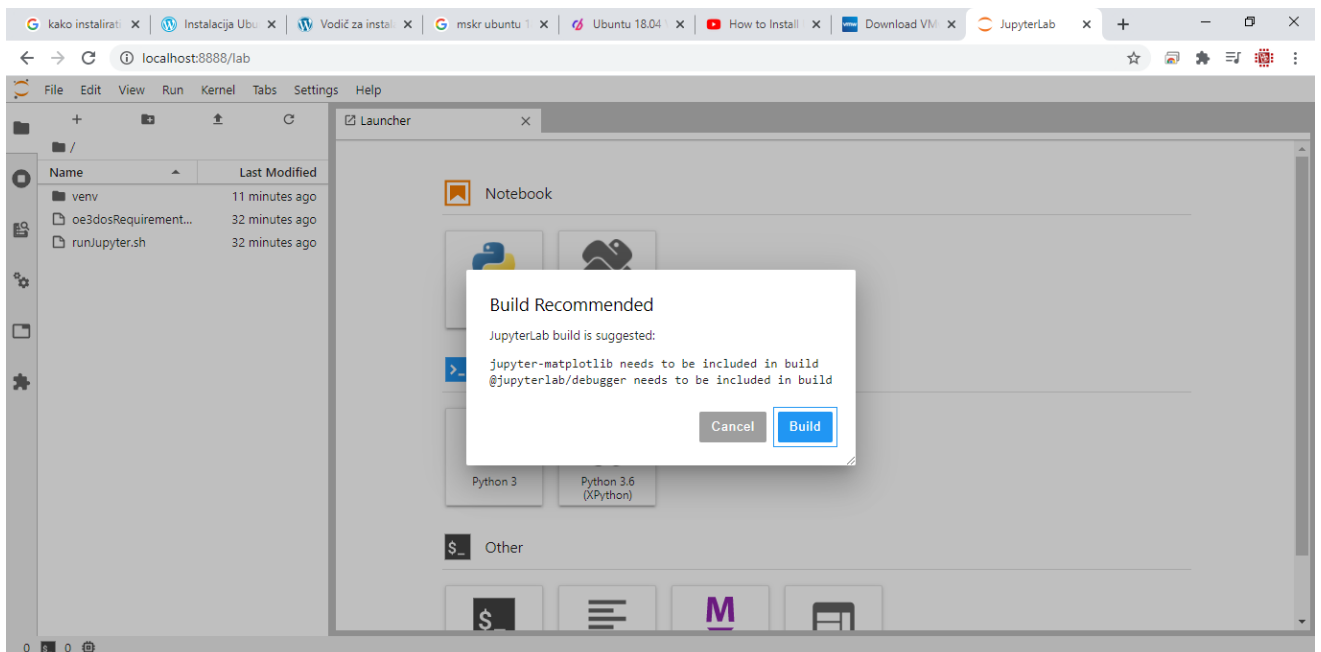


```
Select vladimir@DESKTOP-HL6KV14: ~/oe3dos
drwxrwxrwx 1 vladimir vladimir 4096 Oct  5 12:12 venv/
vladimir@DESKTOP-HL6KV14:~/oe3dos$ source runJupyter.sh
[I 12:20:12.526 LabApp] Writing notebook server cookie secret to /home/vladimir/.local/share/jupyter/runtime/notebook_cookie_secret
[I 12:20:20.601 LabApp] JupyterLab extension loaded from /home/vladimir/oe3dos/venv/lib/python3.6/site-packages/jupyterlab
[I 12:20:20.604 LabApp] JupyterLab application directory is /home/vladimir/oe3dos/venv/share/jupyter/lab
[I 12:20:20.614 LabApp] Serving notebooks from local directory: /home/vladimir/oe3dos
[I 12:20:20.615 LabApp] Jupyter Notebook 6.1.3 is running at:
[I 12:20:20.616 LabApp] http://localhost:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0
[I 12:20:20.617 LabApp] or http://127.0.0.1:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0
[I 12:20:20.618 LabApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 12:20:20.669 LabApp]

To access the notebook, open this file in a browser:
file:///home/vladimir/.local/share/jupyter/runtime/nbserver-5914-open.html
Or copy and paste one of these URLs:
http://localhost:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0
or http://127.0.0.1:8888/?token=69c1b71d3773559d3cfb85c5a220db9dd4bf601aaf1200d0
Start : This command cannot be run due to the error: The system cannot find the file specified.
At line:1 char:1
+ Start "file:///home/vladimir/.local/share/jupyter/runtime/nbserver-59 ...
+ ~~~~~
+ CategoryInfo          : InvalidOperation: (:) [Start-Process], InvalidOperationException
+ FullyQualifiedErrorId : InvalidOperationException,Microsoft.PowerShell.Commands.StartProcessCommand

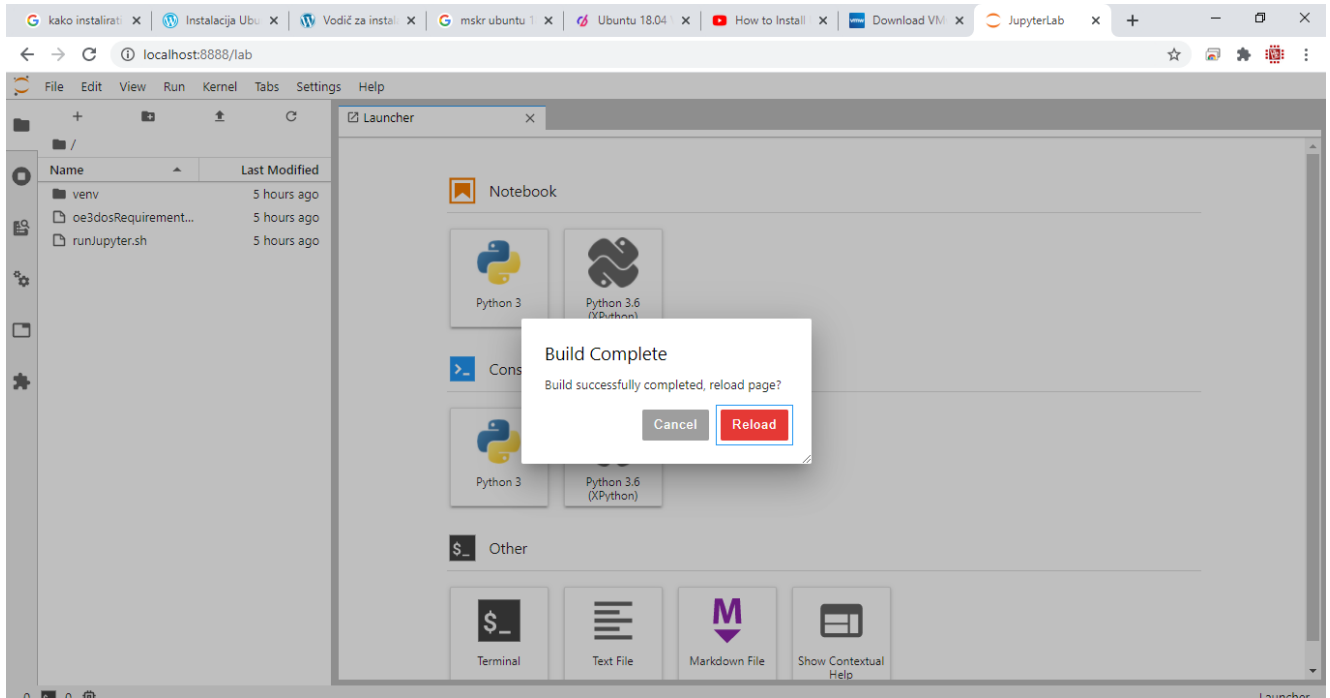
[I 12:21:42.651 LabApp] 302 GET / (127.0.0.1) 2.85ms
[I 12:21:42.656 LabApp] 302 GET /lab? (127.0.0.1) 3.00ms
```

7. U browser će se pojaviti Jupyter okruženje i pitaće vas da želite da kompajlirate okruženje. Naravno da želite i kliknete na Build.





8. Sačekajte, sačekajte, sačekajte. Reload iiiii spremni ste!



9. Jupyter server se isključuje sa Ctrl+C iz komandne linije.

## 5. Instalacija LaTeX-a

1. Za izveštaje i lepe grafike, neophodno je instalirati LaTeX. Samo pokrenite skriptu koja je već spremna u home direktorijumu:  
`source latexForJupyter.sh`
2. Sačekajte, ukucajte šifru, kažite Y i čekajte, čekajte.