AGA414
Ferramentas para a redução de dados

- Linux (ou OS X)
- **IRAF**

Prof. Jorge Meléndez

Installing IRAF on linux
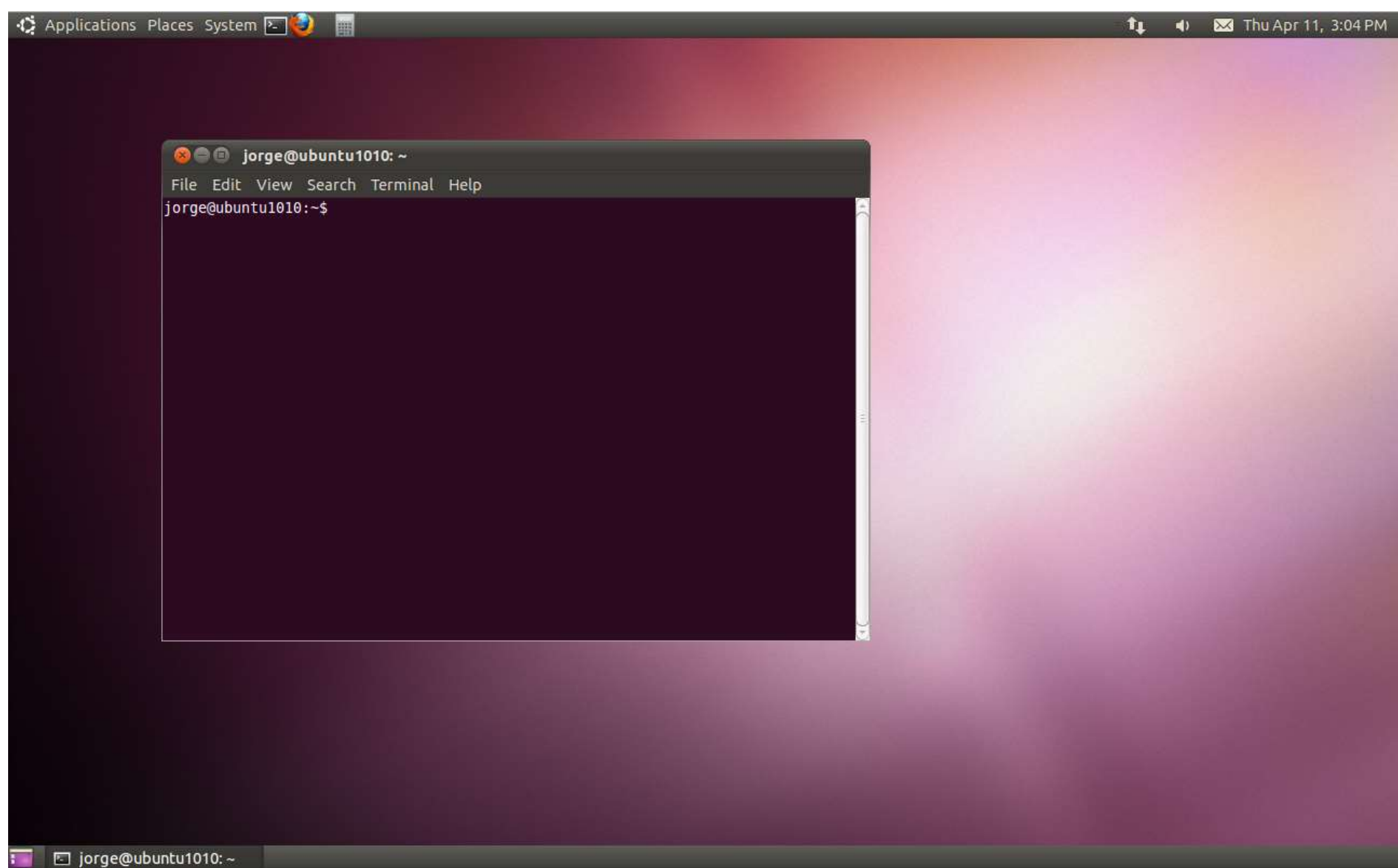# (or on OS X / mac)

- **Installing Linux**

Se prefere Ubuntu, recomendo Ubuntu 12.04 LTS **(Long Term Support: 5 years from April 2012).**

- Opções:

- Particionar o disco (1 partição win e 1 linux)

- Usar apenas linux

- Instalar linux no windows em uma Virtual machine (e.g. Oracle Virtual Box)

Introdução ao Linux

1. Abrir um terminal

```
jorge@ubuntu1010: ~/for

File  Edit  View  Search  Terminal  Help
jorge@ubuntu1010:~$ rm tips_copia.txt
jorge@ubuntu1010:~$ ls
ares          Downloads           for      kurucz    tex                 ts_test
atlas         element_kur         hires    li        TiO                 uves
cross         eso                 ifort    marcs     tips_ifortran.txt   uves_twins
Desktop       examples.desktop    ir       moog2002  tips.txt
Documents     FeH                 iraf     Music     ts
jorge@ubuntu1010:~$ cd for
jorge@ubuntu1010:~/for$ ls *.f
agerotation.f     feh2003.f           hiresjan06_1.f    media.f
agevsini.f        fit2error.f         hiresjan06.f      mediap.f
alfa.f            fit2.f              hiresjun05_1.f    mediar.f
angles.f          fiterro.f           hiresjun05.f      mk2mhz.f
ares_check.f      fit.f               hiresoct05_1.f    modulo.f
bc_bessell.f      fitmontecarlo.f     hiresoct05.f      newinter.f
chi2.f            galactic.f          inter4.f          noise.f
cno2009.f         galacticj.f         interinput.f      population.f
cno2009versao2.f  get2mass_andy2.f    inti.f            s2n_mcd.f
cno.f             get2mass_andy.f     jhtomoog.f        spearman.f
combina.f         get2mass.f          loggexo.f         tcs2mass.f
coord.f           get_abm13.f         loggexo_IRFM.f    tef6553.f
differential.f    get_abm15blue.f     loggexo_newbc.f   tefalonso.f
distance.f        get_abm15.f         logg.f            tef.f
ebv.f             get_abund.f         logg_newbc.f      teffluca.f
ebvna.f           get_abund_mike.f    luminosity.f      temp.f
errortg.f         getebvjun03.f       medialover2.f     wn.f
extchen.f         hfs5.f              media2.f          wntowl.f
jorge@ubuntu1010:~/for$ gfortran angles.f -o angles
```

4. Rodar o programa a partir de diversos diretorios

```
jorge@ubuntu1010: ~/for

File  Edit  View  Search  Terminal  Help
jorge@ubuntu1010:~/for$ ./angles
 STAR 1(lower RA), hh mm ss +/- dd mm ss
10 22 50 - 11 30 08
 STAR 2(higher RA), hh mm ss +/- dd mm ss
10 22 53 - 11 30 47
  155.708333 -11.5022222  155.720833 -11.5130556 RA1,DEC1,RA2,DEC2
  0.749045222 -0.662518869 sinPA  cosPA
 0  0  58.9 angle (dd mm ss)       131.49 PA(dd)
jorge@ubuntu1010:~/for$ cd ..
jorge@ubuntu1010:~$ /home/jorge/for/angles
 STAR 1(lower RA), hh mm ss +/- dd mm ss
^CInterrupt
jorge@ubuntu1010:~$ ~/for/angles
 STAR 1(lower RA), hh mm ss +/- dd mm ss
^CInterrupt
jorge@ubuntu1010:~$ pwd
/home/jorge
jorge@ubuntu1010:~$ rm /home/jorge/for/angles
jorge@ubuntu1010:~$ ~/for/angles
bash: /home/jorge/for/angles: No such file or directory
```

```
jorge@ubuntu1010:~/for$ cd ..
jorge@ubuntu1010:~$ ls
ares            Downloads        for    kurucz    tex                ts_test
atlas           element_kur      hires  li        TiO                uves
cross           eso              ifort  marcs     tips_ifortran.txt  uves_twins
Desktop         examples.desktop ir     moog2002  tips.txt
Documents       FeH              iraf   Music     ts
jorge@ubuntu1010:~$ tar cvf teste.tar *.txt
tips_ifortran.txt
tips.txt
jorge@ubuntu1010:~$ ls
ares            Downloads        for    kurucz    teste.tar          ts
atlas           element_kur      hires  li        tex                ts_test
cross           eso              ifort  marcs     TiO                uves
Desktop         examples.desktop ir     moog2002  tips_ifortran.txt  uves_twins
Documents       FeH              iraf   Music     tips.txt
jorge@ubuntu1010:~$ mkdir teste
jorge@ubuntu1010:~$ mv teste.tar teste
jorge@ubuntu1010:~$ cd teste
jorge@ubuntu1010:~/teste$ tar -xvf teste.tar
tips_ifortran.txt
tips.txt
jorge@ubuntu1010:~/teste$ ls
teste.tar  tips_ifortran.txt  tips.txt
jorge@ubuntu1010:~/teste$ cd ..
jorge@ubuntu1010:~$ rm -r teste*
jorge@ubuntu1010:~$ ls
ares            Downloads        for    kurucz    tex                ts_test
atlas           element_kur      hires  li        TiO                uves
cross           eso              ifort  marcs     tips_ifortran.txt  uves_twins
Desktop         examples.desktop ir     moog2002  tips.txt
Documents       FeH              iraf   Music     ts
```

```
jorge@ubuntu1010:~$ cd for
jorge@ubuntu1010:~/for$ more angles.f
        program angles
c       angle and equatorial PA between 2 stars
        implicit none
        real*8 RAh1,RAm1,RAs1,RAh2,RAm2,RAs2
        character*1 DEC1,DEC2
        real*8 DEd1,DEd2,DEm1,DEm2,DEs1,DEs2
        real*8  signo,RAdeg1,RAdeg2,DECdeg1,DECdeg2,d1,d2,a1,a2
        real*8 ang,PI,aSEC,sinPA,angrad,PA,tanPA,RAdif
        integer aDEG,aMIN
        real*8 ca2a1,sa2a1,sd1,sd2,cd1,cd2,cosPA,PAc,PAs

c       test for binary stars
c       19 30 43.28 + 27 57 34.9 bet Cyg A HD 183912
c       19 30 45.40 + 27 57 55.0 bet Cyg B HD 183914
c       Separation: 34.6" Position angle: 55
c17 14 38.88  + 14 23 25.0
c17 14 39.22  + 14 23 24.0
c   sep 4.4 PA=112
c02 31 49.08 + 89 15 50.8
c02 30 41.63  + 89 15 38.1
c sep 18" PA=217
        PI=3.1415927

        print*, 'STAR 1(lower RA), hh mm ss +/- dd mm ss'
        read (*,*) RAh1,RAm1,RAs1,DEC1,Ded1,dem1,des1
        print*, 'STAR 2(higher RA), hh mm ss +/- dd mm ss'
        read (*,*) RAh2,RAm2,RAs2,DEC2,Ded2,dem2,des2

          RAdeg1=15.0*(RAh1+RAm1/60.0+RAs1/3600.0)
          RAdeg2=15.0*(RAh2+RAm2/60.0+RAs2/3600.0)
--More--(40%)
```

7. Tail (para ver o final do arquivo) e gedit (editor de texto)
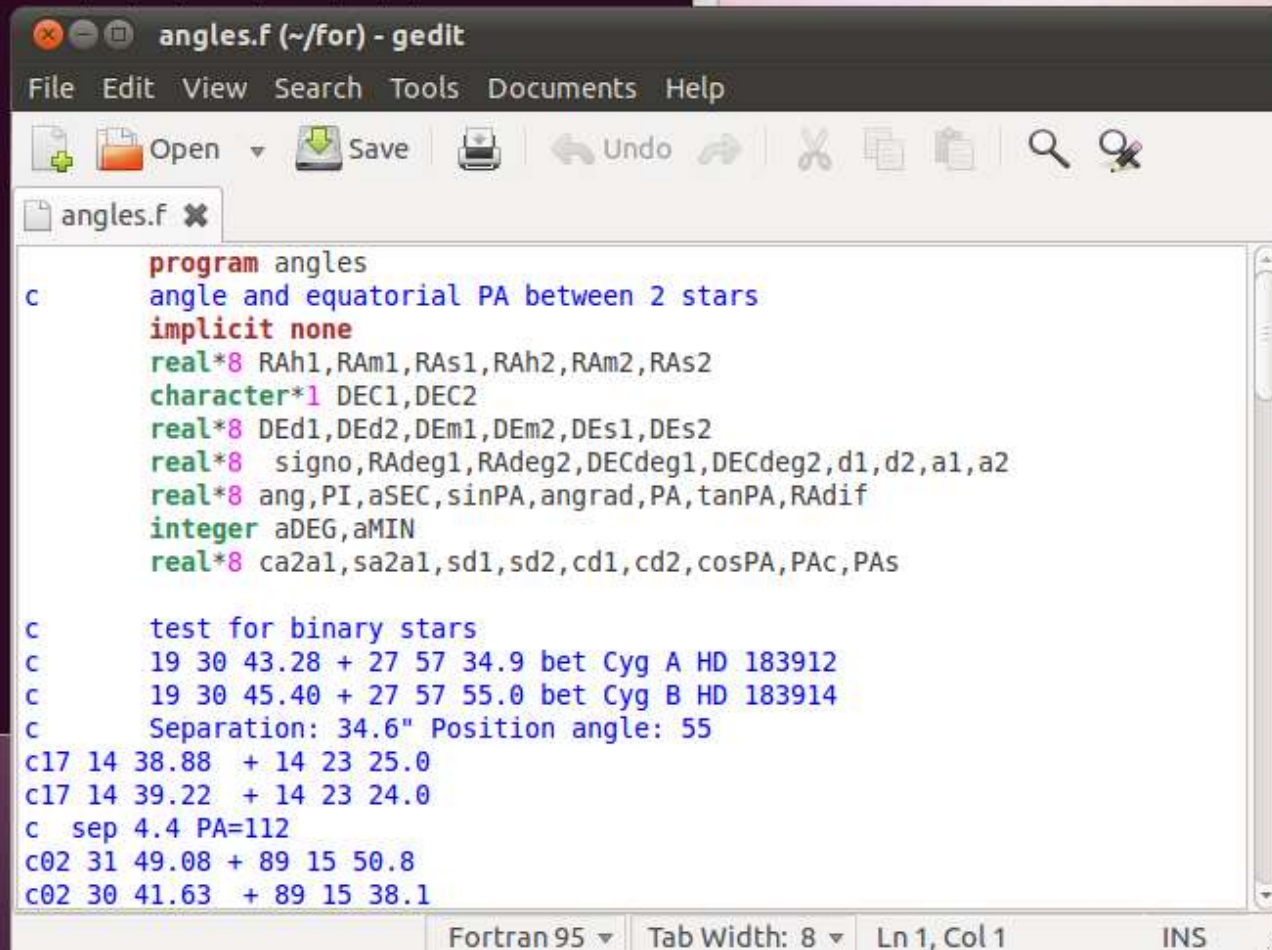
File   Edit   View   Search   Terminal   Help

```
jorge@ubuntu1010:~/for$ tail angles.f
          end if


      write(*,*) RAdeg1,DECdeg1,RAdeg2,DECdeg2,' RA1,DEC1,RA2,DEC2'
      write(*,*)sinPA,cosPA,' sinPA  cosPA'
      write(*,100) aDEG,aMIN,aSEC,PA

100    format(2(I2,1X),F5.1,' angle (dd mm ss) ',1X,F9.2,' PA(dd)')

      END
jorge@ubuntu1010:~/for$ tail -1 angles.f
      END
jorge@ubuntu1010:~/for$ gedit angles.f &
[1] 1869
jorge@ubuntu1010:~/for$ []
```

Kwrite : colunas
Modo bloco

⊗⊖▢   angles.f (~/for) - gedit

File   Edit   View   Search   Tools   Documents   Help

Open ▾   Save | Undo | ✂ | Q Q✗

📄 angles.f ✖

```
      program angles
c     angle and equatorial PA between 2 stars
      implicit none
      real*8 RAh1,RAm1,RAs1,RAh2,RAm2,RAs2
      character*1 DEC1,DEC2
      real*8 DEd1,DEd2,DEm1,DEm2,DEs1,DEs2
      real*8   signo,RAdeg1,RAdeg2,DECdeg1,DECdeg2,d1,d2,a1,a2
      real*8 ang,PI,aSEC,sinPA,angrad,PA,tanPA,RAdif
      integer aDEG,aMIN
      real*8 ca2a1,sa2a1,sd1,sd2,cd1,cd2,cosPA,PAc,PAs

c     test for binary stars
c          19 30 43.28 + 27 57 34.9 bet Cyg A HD 183912
c          19 30 45.40 + 27 57 55.0 bet Cyg B HD 183914
c          Separation: 34.6" Position angle: 55
c17 14 38.88  + 14 23 25.0
c17 14 39.22  + 14 23 24.0
c  sep 4.4 PA=112
c02 31 49.08 + 89 15 50.8
c02 30 41.63  + 89 15 38.1
```

Fortran 95 ▾ | Tab Width: 8 ▾ | Ln 1, Col 1 | INS

8. Existem diversos comandos no linux que podem facilitar muito a sua vida, p.ex.: **cat, grep, awk**. Por exemplo, copiar 1a e 3a colunas de um arquivo

```
7041.907    0.0829   -2.995   0.0    14.    0.0   (3,0)R    5.5
7044.129    0.0838   -2.995   0.0    14.    0.0   (3,0)R    5.5
7046.431    0.0938   -2.926   0.0    16.    0.0   (3,0)R    6.5
7050.849    0.0950   -2.926   0.0    16.    0.0   (3,0)R    6.5
7052.458    0.1064   -2.868   0.0    18.    0.0   (3,0)R    7.5
7055.964    0.0613   -2.959   0.0    16.    0.0   (3,0)R    6.5
7055.989    0.0615   -2.959   0.0    16.    0.0   (3,0)R    6.5
7059.141    0.1079   -2.867   0.0    18.    0.0   (3,0)R    7.5
7059.221    0.0728   -2.894   0.0    18.    0.0   (3,0)R    7.5
7059.992    0.1206   -2.816   0.0    20.    0.0   (3,0)R    8.5
7060.836    0.0732   -2.894   0.0    18.    0.0   (3,0)R    7.5
7063.513    0.0859   -2.838   0.0    20.    0.0   (3,0)R    8.5
7067.059    0.0865   -2.839   0.0    20.    0.0   (3,0)R    8.5
7068.885    0.1004   -2.790   0.0    22.    0.0   (3,0)R    9.5
7068.917    0.1224   -2.815   0.0    20.    0.0   (3,0)R    8.5
7069.085    0.1365   -2.769   0.0    22.    0.0   (3,0)R    9.5
7069.924    0.1184   -2.970   0.0    14.    0.0   (3,0)R    5.5
7074.352    0.1198   -2.969   0.0    14.    0.0   (3,0)R    5.5
7074.653    0.1013   -2.791   0.0    22.    0.0   (3,0)R    9.5
7075.393    0.1164   -2.747   0.0    24.    0.0   (3,0)R   10.5
7076.787    0.1305   -2.906   0.0    16.    0.0   (3,0)R    6.5
7079.707    0.1540   -2.727   0.0    24.    0.0   (3,0)R   10.5
7080.104    0.1385   -2.768   0.0    22.    0.0   (3,0)R    9.5
7081.529    0.1317   -2.905   0.0    16.    0.0   (3,0)R    6.5
7083.086    0.1340   -2.708   0.0    26.    0.0   (3,0)R   11.5
7083.685    0.1176   -2.748   0.0    24.    0.0   (3,0)R   10.5
```

```
7041.907   -2.995
7044.129   -2.995
7046.431   -2.926
7050.849   -2.926
7052.458   -2.868
7055.964   -2.959
7055.989   -2.959
7059.141   -2.867
7059.221   -2.894
7059.992   -2.816
7060.836   -2.894
7063.513   -2.838
7067.059   -2.839
7068.885   -2.790
7068.917   -2.815
7069.085   -2.769
7069.924   -2.970
7074.352   -2.969
7074.653   -2.791
7075.393   -2.747
7076.787   -2.906
7079.707   -2.727
7080.104   -2.768
7081.529   -2.905
7083.086   -2.708
7083.685   -2.748
```

awk '{print $1,$3}' arquivo.txt > saida.txt

9. Exemplo do *grep*:
quantas estrelas foram observadas em 2013.06.24?

```
Jorges-MacBook-Air:opd jorge$ more targets_LNA_observadas.dat
OBSERVADAS     ID         RA          DEC        B      2MASS_NAME
E 2013.06.24 0001    00 01 24.3    +25 15 46.8   9.7    2MASSJ00012427+2515466
             0002    00 01 42.0    -01 08 24.0   9.9    2MASSJ00014204-0108238
E 2013.06.24 0003    00 01 53.8    +08 31 54.1   9.5    2MASSJ00015378+0831541
             0004    00 04 16.5    -59 18 54.7   9.3    2MASSJ00041652-5918546
             0005    00 04 34.1    -73 51 10.4   9.6    2MASSJ00043410-7351105
E 2013.09.18 0006    00 04 37.3    -81 20 43.1   9.7    2MASSJ00043735-8120432
             0007    00 06 59.7    -62 55 25.3  10.7    2MASSJ00065971-6255255
             0008    00 08 48.7    +08 01 18.5   8.3    2MASSJ00084873+0801188
E 2013.06.24 0009    00 14 49.8    -28 59 14.6  10.1    2MASSJ00144982-2859145
E 2013.06.24 0010    00 16 16.6    +27 54 54.7   9.6    2MASSJ00161656+2754546
E 2013.06.24 0011    00 24 57.6    +14 19 41.5  10.8    2MASSJ00245756+1419415
E 2014.01.10 Padrao 00 31 16.9 -16 47 40.8       8.5    HD 002796
             Padrao 00 31 16.9 -16 47 40.8       8.5    HD 002796
             0012    00 31 51.6    -00 10 14.2   9.8    2MASSJ00315162-0010143
E 2013.06.25 0013    00 35 55.6    -54 52 20.6  10.1    2MASSJ00355562-5452205
E 2013.09.18 0014    00 39 28.6    +25 46 09.5   9.7    2MASSJ00392860+2546095
E 2013.06.24 0015    00 41 01.3    +10 20 02.8  10.7    2MASSJ00410133+1020027
             0016    00 41 02.4    +25 15 38.9   9.7    2MASSJ00410240+2515388
             0017    00 41 34.0    +01 44 52.8   8.7    2MASSJ00413399+0144526
             0018    00 43 39.8    -86 16 40.4   9.4    2MASSJ00433973-8616404
E 2013.06.24 0019    00 43 54.0    -20 23 59.3   9.6    2MASSJ00435404-2023591
             0020    00 44 25.4    +09 57 09.7   9.6    2MASSJ00442536+0957093
```

...

Mais de 1500 estrelas

9. Exemplo do *grep*:
quantas estrelas foram observadas em 2013.06.24?

```
Jorges-MacBook-Air:opd jorge$ more targets_LNA_observadas.dat
OBSERVADAS    ID        RA          DEC        B     2MASS_NAME            T
E 2013.06.24 0001   00 01 24.3   +25 15 46.8   9.7   2MASSJ00012427+2515466
             0002   00 01 42.0   -01 08 24.0   9.9   2MASSJ00014204-0108238
E 2013.06.24 0003   00 01 53.8   +08 31 54.1   9.5   2MASSJ00015378+0831541
             0004   00 04 16.5   -59 18 54.7   9.3   2MASSJ00041652-5918546
             0005   00 04 34.1   -73 51 10.4   9.6   2MASSJ00043410-7351105
E 2013.09.18 0006   00 04 37.3   -81 20 43.1   9.7   2MASSJ00043735-8120432
             0007   00 06 59.7   -62 55 25.3  10.7   2MASSJ00065971-6255255
             0008   00 08 48.7   +08 01 18.5   8.3   2MASSJ00084873+0801188
E 2013.06.24 0009   00 14 49.8   -28 59 14.6  10.1   2MASSJ00144982-2859145
E 2013.06.24 0010   00 16 16.6   +27 54 54.7   9.6   2MASSJ00161656+2754546
E 2013.06.24 0011   00 24 57.6   +14 19 41.5  10.8   2MASSJ00245756+1419415
E 2014.01.10 Padrao 00 31 16.9 -16 47 40.8   8.5   HD 002796
             Padrao 00 31 16.9 -16 47 40.8   8.5   HD 002796
             0012   00 31 51.6   -00 10 14.2   9.8   2MASSJ00315162-0010143
E 2013.06.25 0013   00 35 55.6   -54 52 20.6  10.1   2MASSJ00355562-5452205
E 2013.09.18 0014   00 39 28.6   +25 46 09.5   9.7   2MASSJ00392860+2546095
E 2013.06.24 0015   00 41 01.3   +10 20 02.8  10.7   2MASSJ00410133+1020027
             0016   00 41 02.4   +25 15 38.9   9.7   2MASSJ00410240+2515388
             0017   00 41 34.0   +01 44 52.8   8.7   2MASSJ00413399+0144526
             0018   00 43 39.8   -86 16 40.4   9.4   2MASSJ00433973-8616404
E 2013.06.24 0019   00 43 54.0   -20 23 59.3   9.6   2MASSJ00435404-2023591
             0020   00 44 25.4   +09 57 09.7   9.6   2MASSJ00442536+0957093
```

> **grep -c "2013.06.24" targets_LNA_observadas.dat**
> **129**

Instalando o IRAF no linux

- Instalação automática para Ubuntu 12.04 LTS

Fernando A. Avila Castro

http://www.astrosen.unam.mx/~favilac/linastro.html

Get .iso file from:

http://www.astrosen.unam.mx/~favilac/IRAF/

- Mount .iso file

- Enable universe and multiverse repositories:

http://askubuntu.com/questions/148638/how-do-i-enable-the-universe-repository

For older Ubuntu versions or further tips check:

http://iraf.net/phpBB2/viewtopic.php?t=89724

Primeiro uso do IRAF

- Criar um diretorio iraf na sua area usando um terminal:

- mkdir iraf (por ex., agora tera um diretorio /home/jorge/iraf)

- Entrar no diretorio iraf: cd iraf

- mkiraf e escolher xgterm

Para usar o iraf: abrir terminal *xgterm, cd iraf* e dar *cl*


```
jorge@ubuntu1010: ~/iraf

File  Edit  View  Search  Terminal  Help
jorge@ubuntu1010:~$ pwd
/home/jorge
jorge@ubuntu1010:~$ cd iraf
jorge@ubuntu1010:~/iraf$ xgterm &
[1] 1915
jorge@ubuntu1010:~/iraf$
```

```
jorge@ubuntu1010: ~/iraf

jorge@ubuntu1010:~/iraf$ cl
```

Opening ds9:
cl> !ds9 &

SAOImage ds9

File Edit View Frame Bin Zoom Scale Color Region WCS Analysis   Help

File		
Object		
Value		
WCS		
Physical	X	Y
Image	X	Y
Frame 1	Zoom	1.000	Angle	0.000

| file	edit	view	frame	bin	zoom	scale	color	region	wcs	help
about	open	save image	header	page setup	print	exit

```
   NOAO/IRAFNET PC-IRAF Revisi
   This is the RELEASED version


Welcome to IRAF.  To list the
detailed information about a
command  or  load  a  package
package, or `logout' to get o
what is new in the version of

Visit http://iraf.net if you

The following commands or pac

    color,      guiapps,
    dataio,     images,
    dbms,       language,
    fitsutil,   lists,

ecl> !ds9 &
ecl> []
```
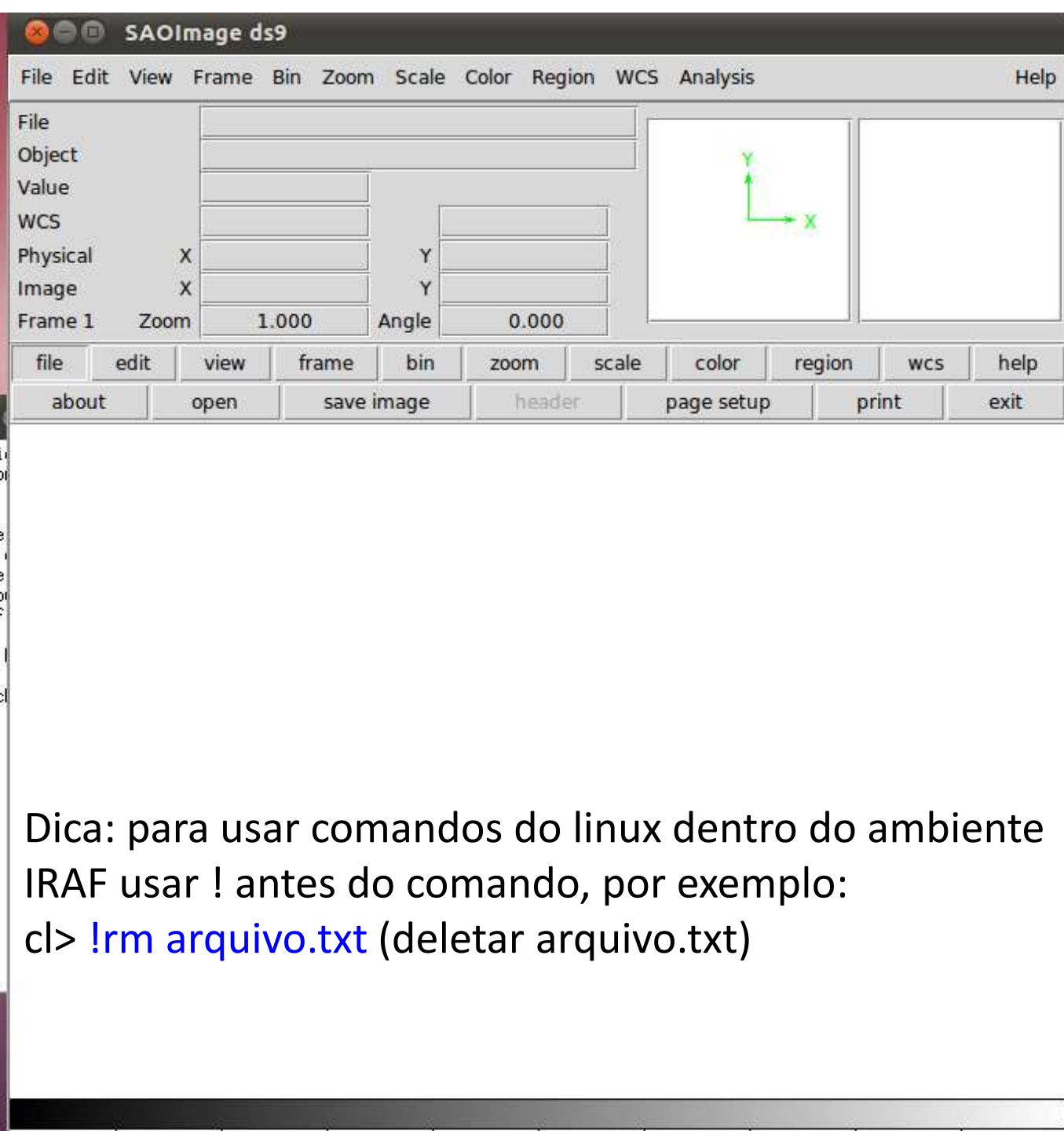
Dica: para usar comandos do linux dentro do ambiente IRAF usar ! antes do comando, por exemplo:
cl> !rm arquivo.txt (deletar arquivo.txt)

- README - TUTORIAL DE INTRODUÇÃO AO IRAF

- Caso não possua ainda um diretorio **iraf**, antes de baixar o tutorial, criar um diretorio iraf na sua area:

> mkdir iraf (por ex., agora tera um diretorio /home/usuario/iraf)

- Entrar no diretorio iraf:

> cd iraf

- Download o tutorial intro.tar para o diretorio iraf

http://www.astro.iag.usp.br/~jorge/aga414/intro.tar

- Untar o tutorial: > tar -xvf intro.tar

- Entrar no diretorio intro (cd intro) e seguir as indicacoes do arquivo *intro_jorge.txt*