PMON (Ref. Ujjwal Kumar)

====== Basic Information ======
This is the Standard Operating Procedure for the new pulsar monitoring program, pmon, which has grown out of the existing monitoring program, known as psr_mon. As the name suggests, this program is used for monitoring, in real-time, the quality of pulsar data coming during observation. This real time information is quite useful as a health-check of the pulsar back-end.

This new pmon has several features over psr_mon, some of which are as follows:

i) It can fold using a variable period computed based on a polyco.dat file generated either by itself using tempo, or using the one provided by the user. However, user can still choose to go for fixed period folding.

ii) The program is also capable of automatically generating the two pulsar specific parameters required - period and DM - using the ATNF pulsar catalogue data base. Again, user can choose from the manual or automatic option.

iii) There is also a feature which will allow the user to skip a specified fraction of data while folding the rest, without loosing coherence. This is in addition to the start block and stop block feature borrowed from the existing program, and is useful to reduce the processing load of pmon.

iv) The program will also guide the user by providing him the sample of pmon.in file (use -H option). It also checks and constrains the values passed by the user for some of the important parameters.

v) Further, pmon will also allow the user to pass and modify the necessary parameters via a user friendly GUI with suitable defaults values so that one is able to run the program with much more convenience.

vi) Another nice feature is that in situations where one needs to run pmon succcessively for different sources while keeping all other parameters in pmon.in unchanged, the user can simplly pass the source name via the command line option '-S'.

vii) Finally the pmon has various sanity checks for input parameters, and if any are found inappropriate, it allows user to re-enter a new suitable value for a parameter on the fly.

USAGE :
pmon <mode> -n <NPOL> <ipol1> <ipol2> -m <mag fac> -s <stokes_sel> -i <inversion> -M <mode>
-d <data length> -P<> -F<> -G<> -S <Source name> -H/h

<mode> : specifying which shm to attach or use file
Options: -a -- use acqpsr's shm
-c -- use collect_psr's shm
-f -- use file for reading data
-n:
<NPOL> : Number of polarizations, Default = 1
<ipol1>: Start polarization, Default = 0
<ipol2>: Stop polarization, Default = 0
-m: magnification factor, Default = 4.0
-s: stokes_sel can have value 0,1,2, Default = 0

-i: <inversion> : whether to invert the data when storing in buffer, Default = 0
      1: invert
      0: dont invert
-M: Mode, to which shm to attach, required only with <mode> option as -a, Default = 0(IA)
      0: ia
      1: pa
      2: polarimeter
-d: data length, Default = sizeof(data_type)
-P: Dont plot the graph, for values mentioned
      d: chart plot
      a: accumulated (cumulative) profile
      c: current profile
      b: bandshape
-F: 'Fixed' period Folding switch, Default = 0
      1 = ON : Fixed Period Folding
      0 = OFF : Variable Period Folding using polycos
-G: 'Generate' polyco switch, Default = 1
      1 = ON : Generate 'polyco.dat' file internally using Tempo.
      0 = OFF : Dont Generate rather use the existing 'polyco.dat.usr' or 'polyco.dat' file
-S: Source Name (This name overrides the source name given in pmon.in, if any).
-H/h: Print a help page showing usage and format of the pmon.in file.

DATA ACCESS MODES (Set using command line option -a , -c or -f):
The program can be run in three modes from the point of view of the source from where
the data is obtained. They are as follows :

  i) Online mode (-a) : This mode should be chosen in case of real time Pulsar observation. This mode is activated by giving command line option '-a'. In this mode the data is acquired from the ACQPSR shared memory . The only other requirement to be able to run this mode is the availability of a suitable pmon.in file in the working directory. A sample of this file is given below for reference.

 ii) Online mode (-c) : This mode should be chosen in case of real time Pulsar observation. This mode is activated by giving command line option '-c'.In this mode the data is acquired from the ACQPSR shared memory. The only other requirement to be able to run this mode is the availability of a suitable pmon.in file in the working directory.A sample of this file is given below for reference.

iii) Offline mode (-f): This mode should be chosen in case of recorded pulsar data. This mode is activated by giving command line option '-f' followed by name of the file or the link to it. There are two other requirements to run this mode:
a) A file named raw.hdr which gives the IST date and Time of the observation of the Pulsar. The file must have the format as that of the *raw.hdr that is created during the observation. Here is the fromat:

#Start time and date

IST Time: hh:mm:ss.sssss
Date: dd:mm:yyyy

b) Suitable pmon.in file in the working directory. A sample of this file is given below for reference.

PROGRAM MODES :

i) Period Modes (Set using command line option -F):

a) Variable Period Folding : This is the default mode of pmon, which can also be activated by giving command line option '-F 0'.(see the Usage section for detailed description). This is its most important feature over the existing equivalent program psr_mon. They way pmon does this is that it uses the polynomial coefficients, corresponding to the taylor series expansion of the phase variation of a pulsar, from a file called 'polyco.dat' or 'polyco.dat.usr', based on which it computes the phase for each sample and bins them appropriately. In this case the value of period passed through the pmon.in is just irrelevant and one can simply give 0.0.

b) Fixed Period Folding : The user can choose to fold the pulsar data using a fixed period. This is possible using the command line option '-F 1' (see the Usage section for detailed description). Further, the user can either provide, in the pmon.in file, the value of period to be used, or can ask the program to automatically generate the period applicable tothe observation epoch by giving a value of period <= 0.0.

ii) DM Modes (Set using value passed in the pmon.in):

a) Automatically generated DM : The user gives any NEGATIVE value for DM in the pmon.in in which case pmon uses psrcat to automaticaly generate the DM for the pulsar in question.

b) User provided DM : The user provides the suitable value of DM in the pmon.in.

iii) Polyco Generation Modes (Set using command line option -G):

a) Automatically Generate polyco.dat : This is the default mode of pmon, which can also be activated by giving command line option '-G 1'. (see the Usage section for detailed description). In this case the program generates the polyco.dat file using tempo. For doing this it needs the source name, No of Coefficients N_Coeff, and maximum hour angle for which polycos needed MAXHA. All this is provided by the user through pmon.in. Apart from all this the MJD of observation is required which in the online case (-a / -c) is automatically generated using the system clock whereas in case of file mode (-f) the raw file is used to get it.

b) User Provided polyco file : This mode gets activated using the command line option '-G 0'(see the Usage section for detailed description). In this mode the user should make sure that a file named either 'polyco.dat.usr' or 'polyco.dat'(see the Variable Period Folding section for details) exists in the working directory. Unless it exists already, the program will make a copy of the polyco.dat named polyco.dat.usr so that it remains safe for reuse. If it does not find any of the two files mentioned above it reports that and forcefully

change mode to the default which is to generate polyco.dat on its own.

SAMPLE 'pmon.in' with description:

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0.128,157.0,16.0,-1     : Sample Interval (millisec), Center Freq (MHz), BW (MHz) &
Sideband flag (+1/-1).
256,3,256               : Total # of Freq Channels, Start & Stop Freq Ch #s to use.
1                       : Reference Ch # for De-dispersion.
0.1,0.01                : Time Interval per plot, Time Interval between updates
(both in secs).
2.5                     : Time Interval for Fold/Spectral updates (in secs).
0,0,0.0                 : Start Blk #, Tot # of Blks & fracn of blcks tobe skipped
(give 0,0,0.0 for doing entire file).
****+****               : Source name with or without J/j/B/b prefixed.
60,12,12                : N_Span (min), N_Coeff, Max_HA for the Polynomial
coefficients in the polyco.dat.
-1                      : DM (pc/cm^3) for de-dispersion: For acquiring     DM using
Catalogue give a # <  0.0
-1                      : period  (millisec) for folding: For acquiring period using
Catalogue give a # <= 0.0
1.0,1.0                 : Expansion factor for time plot(samp_fac), Expansion factor
for folded profile(binfac).
0.0,0.0                 : Phase offset for markers & Initial Phase Offset for
folding (in units of true sample).
0.0,0.0                 : Zoom-in: Start & Stop Xaxis Fraction for profile/spectrum
plots(use 0,0 for full range).
0                       : Domain of Folding : Time(0) / Freq(1).
6,15                    : # of Polarization added in the GAC data, # of integration
in the DSP.
2                       : # of Bad Bands: If its 'N' then list the start & stop chan
# for each band in next N lines.
1,4                     : Start Chan # , Stop Chan # for Bad Band 1.
253,256                 : Start Chan # , Stop Chan # for Bad Band 2.
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