Development and optimization of mpdroot software

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Outline
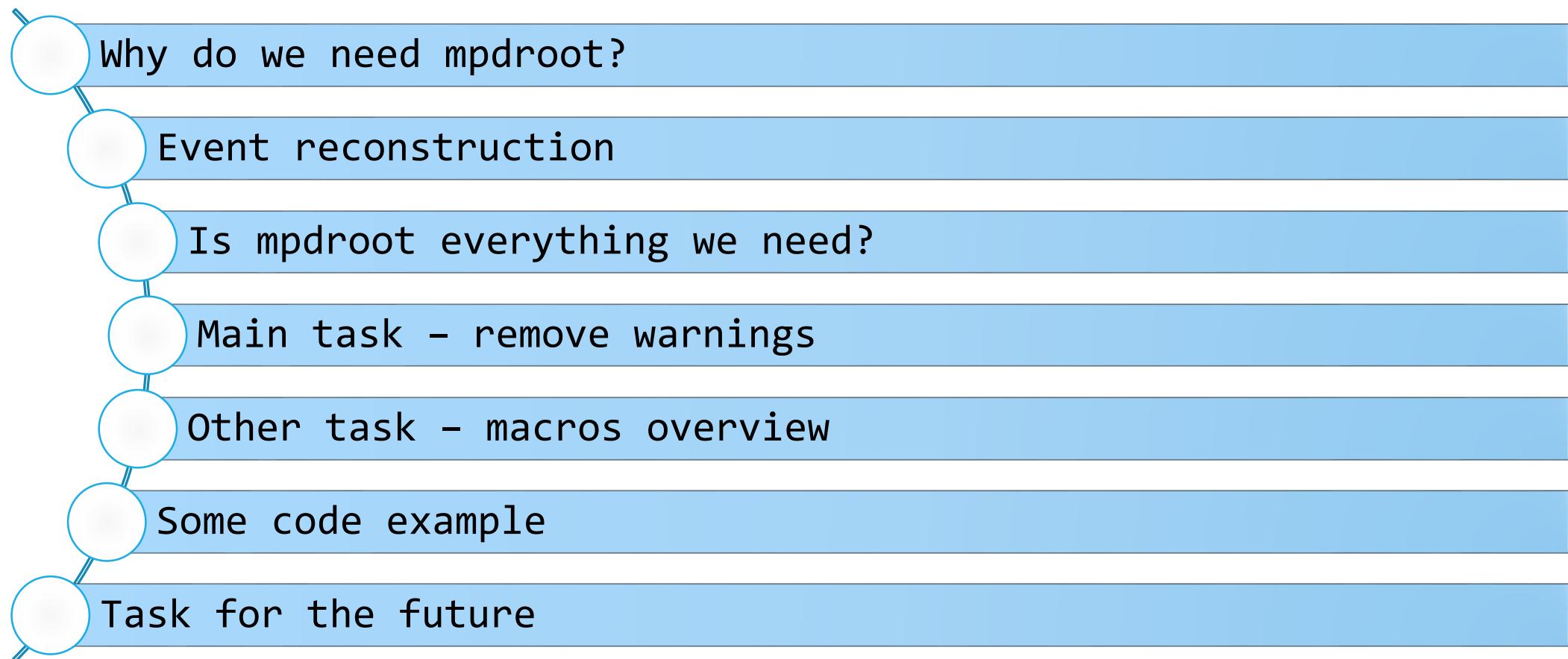
Why do we need mpdroot?
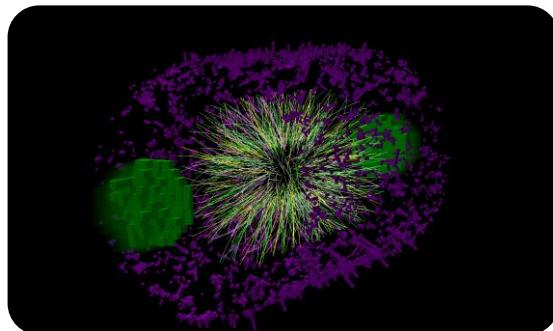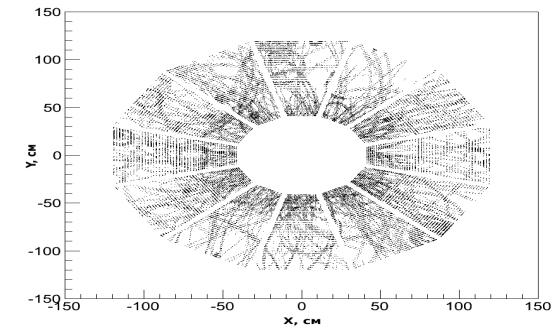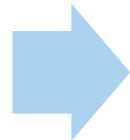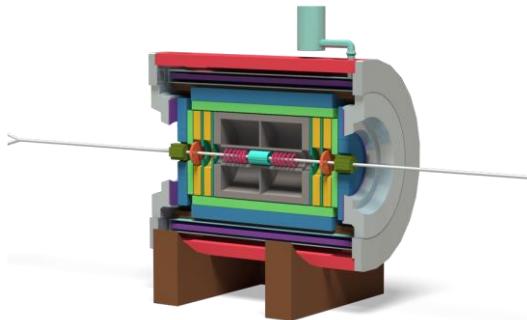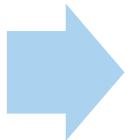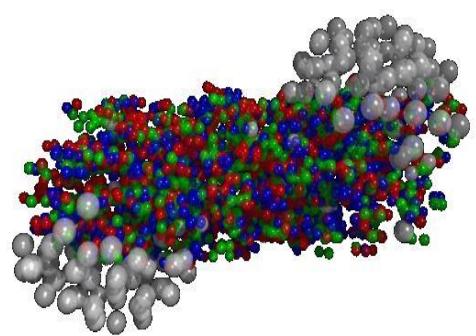
Source: mpd.jinr.ru

mpdroot

Event reconstruction

Hit reconstruction in subdetectors

Tracking

Vertex finding

Particle identification

Reconstruction and tracking
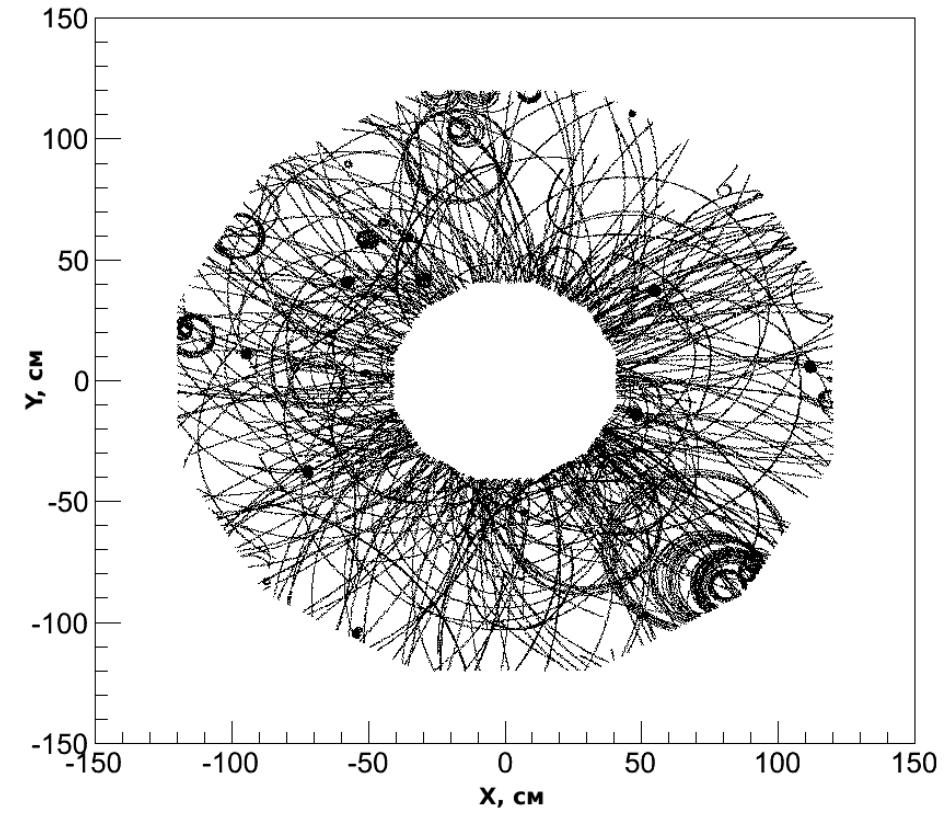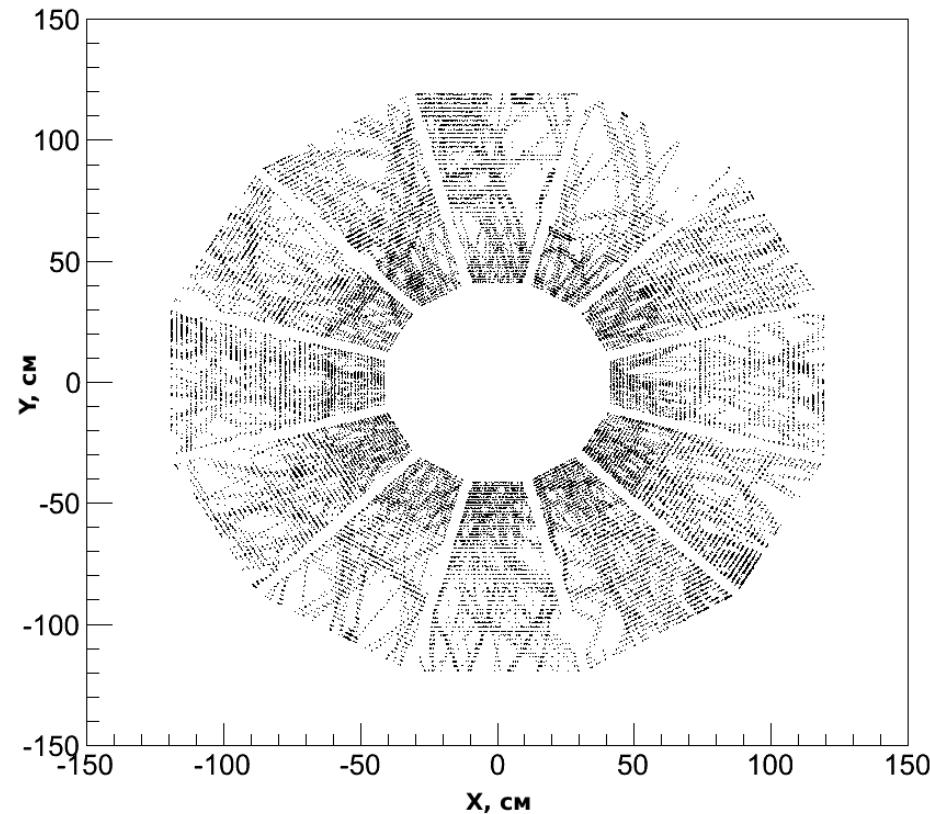
Source: mpd.jinr.ru

Is mpdroot everything we need?
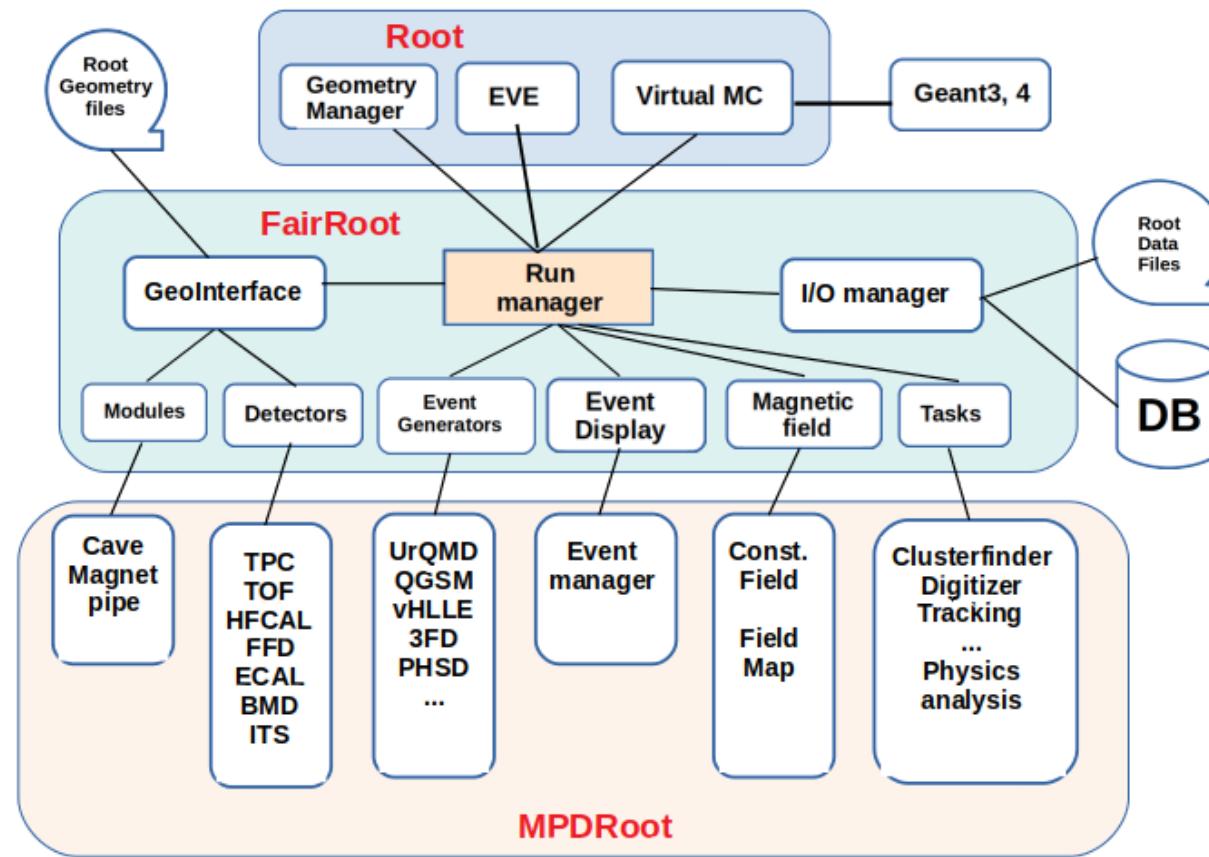
Source: O. Rogachevsky

Main task – remove warnings

From 166 to 0

- All warnings removed
- 1 311 569 lines of code
- Documentation in git for all changes

Most common mistakes

- No return statement
- Redeclarations
- Deprecated function from FairLogger
- Shadowed variables

Other mistakes

- Wrong usage of abs()
- Mistake in fprintf() format

No return statement

```
 99   99  off_t MpdLibZ::seek(off_t pos, int whence)
100  100  {
101  101      switch (whence)
102  102      {
103  103          case 0:
104  104              return gzseek(file, pos, SEEK_CUR);
105  105          case 1:
106  106              return gzseek(file, pos, SEEK_SET);
107  107      }
     108 +    return -1;
108  109  }
```

Redeclarations

```
508  508        Int_t lay  = 1; // layer 1
509  509        fLayBeg[0] = 0; // index for layer 1
510  510        for (Int_t i1 = 0; i1 < nHits; ++i1) {
511  511          MpdStsHit *h = (MpdStsHit*) fItsHits->UncheckedAt(i1);
512    -          Int_t lay = h->Layer();
     512 +          lay = h->Layer();
513  513          if (lay0 != lay) {
514  514        fLayBeg[lay - 1] = i1;
515  515        lay0 = lay;
516  516          }
517  517        }
```

Deprecated function from FairLogger

```
164  164  void TpcDetector::ConstructGeometry() {
165  165      TString fileName = GetGeometryFileName();
166  166
167  167      if ( fileName.EndsWith(".root") ) {
168    -        gLogger->Info(MESSAGE_ORIGIN,
169    -                      "Constructing TPC geometry from ROOT file %s",
170    -                      fileName.Data());
       168 +      LOG(INFO) << "Constructing TPC geometry from ROOT file " << fileName.Data() << endl;
171  169          ConstructRootGeometry();
172  170      }
173  171      else if ( fileName.EndsWith(".geo") ) {
```

Shadowed variables


```
166   166   |   set<Int_t>::iterator it = fDigiSet[isec][irow].begin();

190   190   |       for (Int_t ip = 0; ip < 2; ++ip) {
191    -          for (Int_t it = 0; it < 2; ++it) {
192    -            if (it == ip) continue;
193    -            Int_t ip1 = ipad + ip, it1 = itime + it;
      191 +        for (Int_t it_loop = 0; it_loop < 2; ++it_loop) {
      192 +          if (it_loop == ip) continue;
      193 +          Int_t ip1 = ipad + ip, it1 = itime + it_loop;
194   194          if (ip1 >= fgkNpads) continue;
```

Other task – macros overview

Statistic

- Summary – 150
- Working - 16

Main macros

- reco.C
- runMC.C

Task for the future

- Clean the existing code
- Remove unused classes
- Improve the macros
- Add new macros
- Remove existing memory leakage
- Release a updated software
- Create validation test system for mpdroot
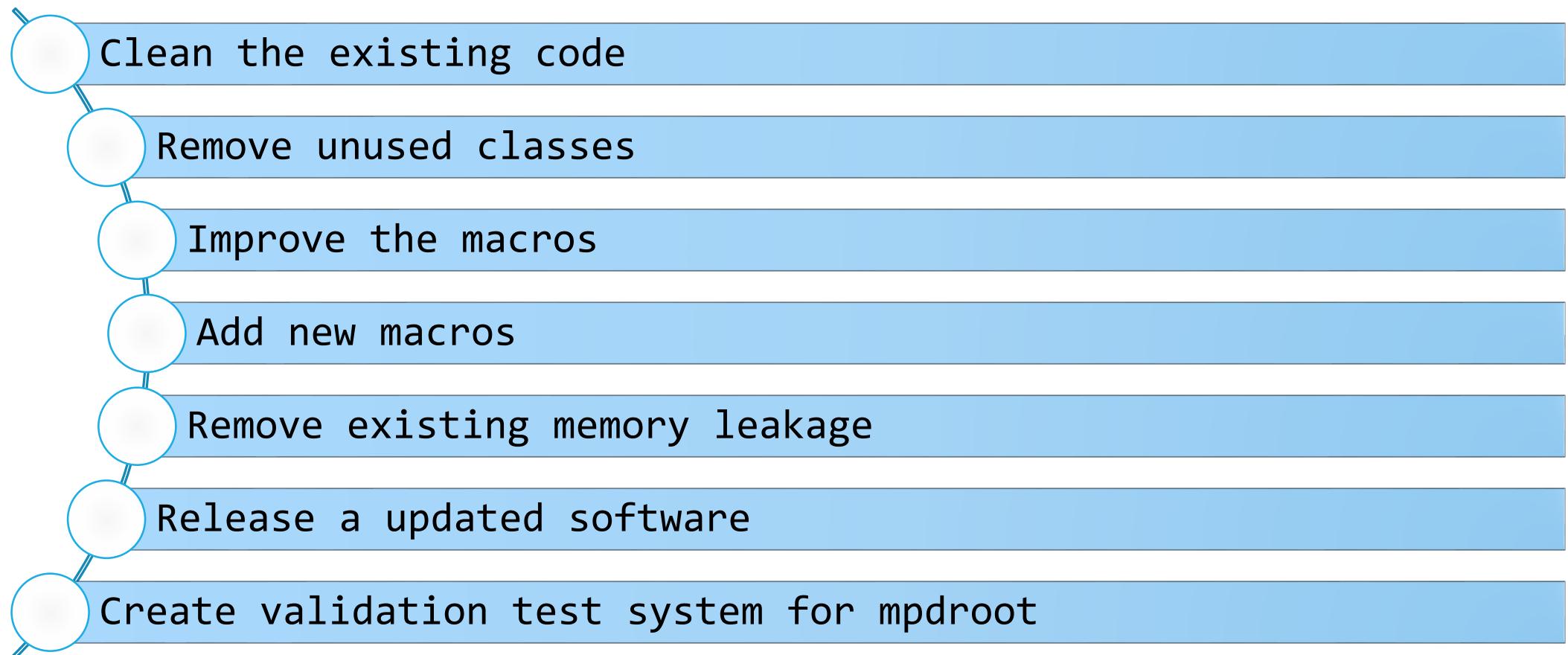
Thank you for your attention!

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