

**Documentation  
of the  
STAR-FTPC Clusterfinder  
source code**

## Important structures and constants :

```
#define TRUE 1
#define FALSE 0
#define MAXNUMSEQUENCES 160
#define MAXSEQPEAKS 160
#define MAXPEAKS 160
#define MAXNUMCUC 128
#define MAXLOOPS 100
#define MAXFASTLOOPS 30
#define UNFOLDLIMIT 0.01
#define UNFOLDFAILEDLIMIT 0.50
```

```
typedef struct tagClusterUC
{
    int          StartPad;
    int          EndPad;
    int          NumSequences;
    int          CutOff;
    TPCSequence Sequence[MAXNUMSEQUENCES];
    int          SequencePad[MAXNUMSEQUENCES];
    struct tagClusterUC* NextClusterUC;
    int          MemoryPtr;
}TClusterUC;
```

```
typedef struct
{
    int Timebin;
    TPCSequence Sequence;
    int height;
    int slope;
    int width;
}TPadPeak;
```

```
typedef struct
{
    int pad;
    int Timebin;
    int pad_saved;
    int Timebin_saved;
    TPCSequence Sequence;
    float TimePosition;
    float PadPosition;
    float PeakHeight;
    float OldTimePosition;
    float OldPadPosition;
    float OldPeakHeight;
    float TimeSigma;
    float PadSigma;
    float Rad;
    float Phi;
    float x;
    float y;
    float z;
}TPeak;
```

```
typedef struct TPCSequence
{
    unsigned short startTimeBin;
    unsigned short LengthI;
    unsigned char *FirstAdc;
}TPCSequence;
```

## Class definitions :

```
class StFtpcClusterFinder
{
    private:
        TPCSequence test;
        TObjArray *mPoint;
        StFTPCReader *mReader;
        StFtpcParamReader *mParam;
        StFtpcDbReader *mDb;

    public:
        StFtpcClusterFinder(StFTPCReader *reader,
                            StFtpcParamReader *paramReader,
                            StFtpcDbReader *dbReader,
                            TObjArray *pointarray);
        ~StFtpcClusterFinder();

        int search();
        int findHits(TClusterUC *Cluster, int, int, double*, double*, float*);!
        int getSeqPeaksAndCalibAmp(TPCSequence*, int, int, int, TPadPeak*, int*);
        int fitPoints(TClusterUC*, int, int, double*, double*, TPeak*, int, float*);
        int padtrans(TPeak*, int, int, double*, double*);
        float gauss_2d(int, int, float, float, float, float, float);
        float sigmax(float);
        float sigmat(float);
        int calcpadtrans(double*, double*);
        int cucInit(TClusterUC*, int*, int*);
        TClusterUC *cucAlloc(TClusterUC*, int*, int*);
        int cucFree(TClusterUC*, int*, int*, TClusterUC*);

};
```

# StFtpcClusteMaker (main program) :

StFtpcClusteMaker ::Make()

StFtpcClusteMaker ::Init()

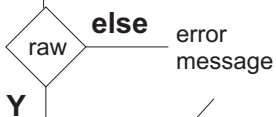
create general objects :

```
St_DataSet *daqDataset  
StDAQReader *daqReader  
StFTPCReader *ftpcReader=NULL  
daqDataset=GetDataSet("StDAQReader")
```

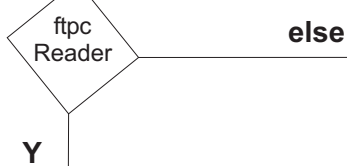
create paramter reader and data base reader objects :

```
StFtpcParamReader *paramReader= new ...  
StFtpcDbRead *dbReader= new ...
```

```
*hitarray=new TobjArray(10000)  
*raw=GetDataSet("ftpc_raw")
```



create tables  
create ftpcReader



```
*step=new StFtpcChargeStep(...)  
*fcl=new StFtpcClusterfinder(...)
```

```
int searchresults=fcl->search()
```

```
delete fcl,step  
if using_FTFC_slow_simulator  
delte ftpcReader
```

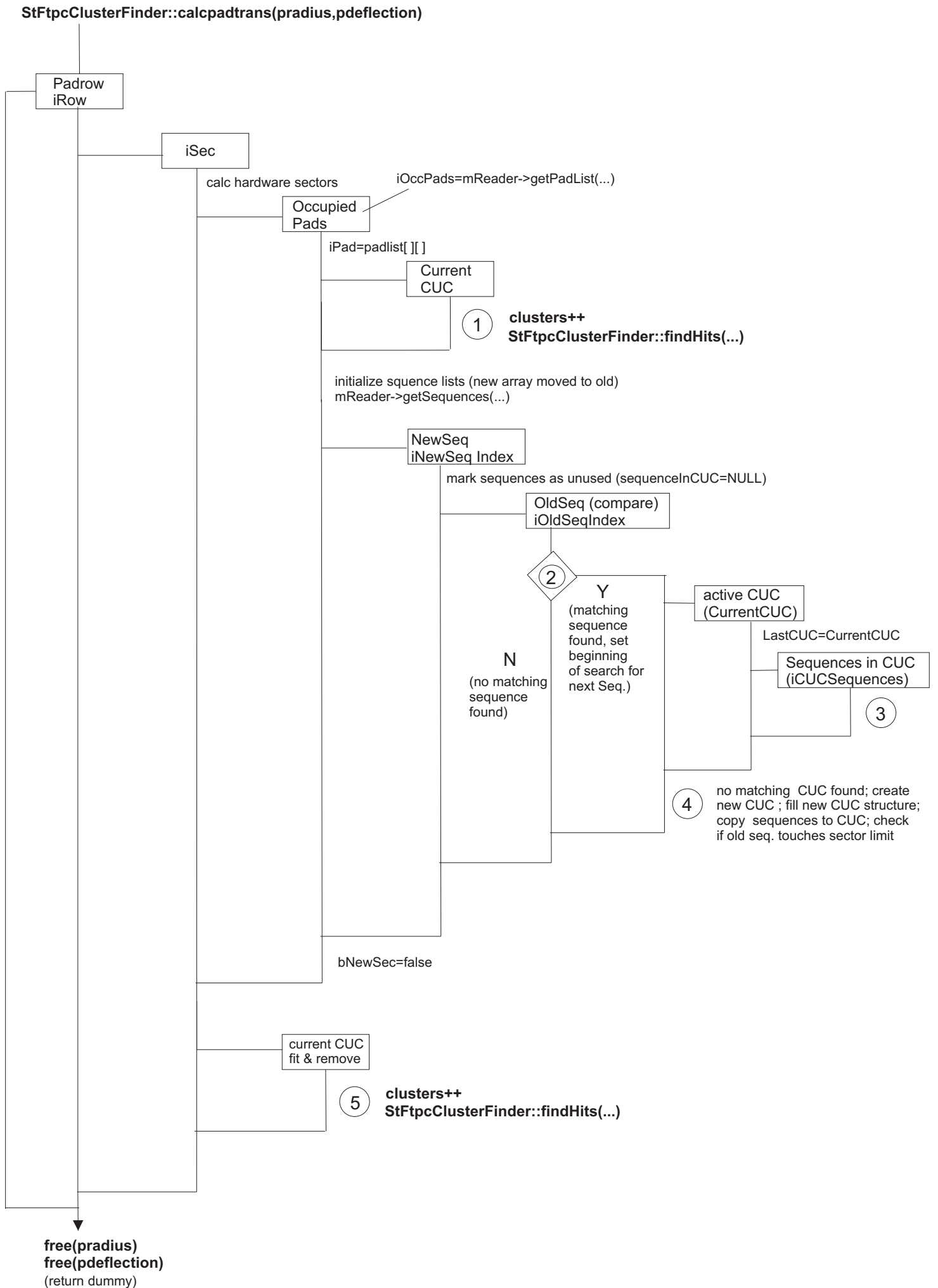
```
int num_points=hitarray->GetEntriesFast();
```

```
create fcl_fppoint_st table  
or  
create ffs_gepoint_st table
```

```
delete arrays, paramReader, dbReader
```

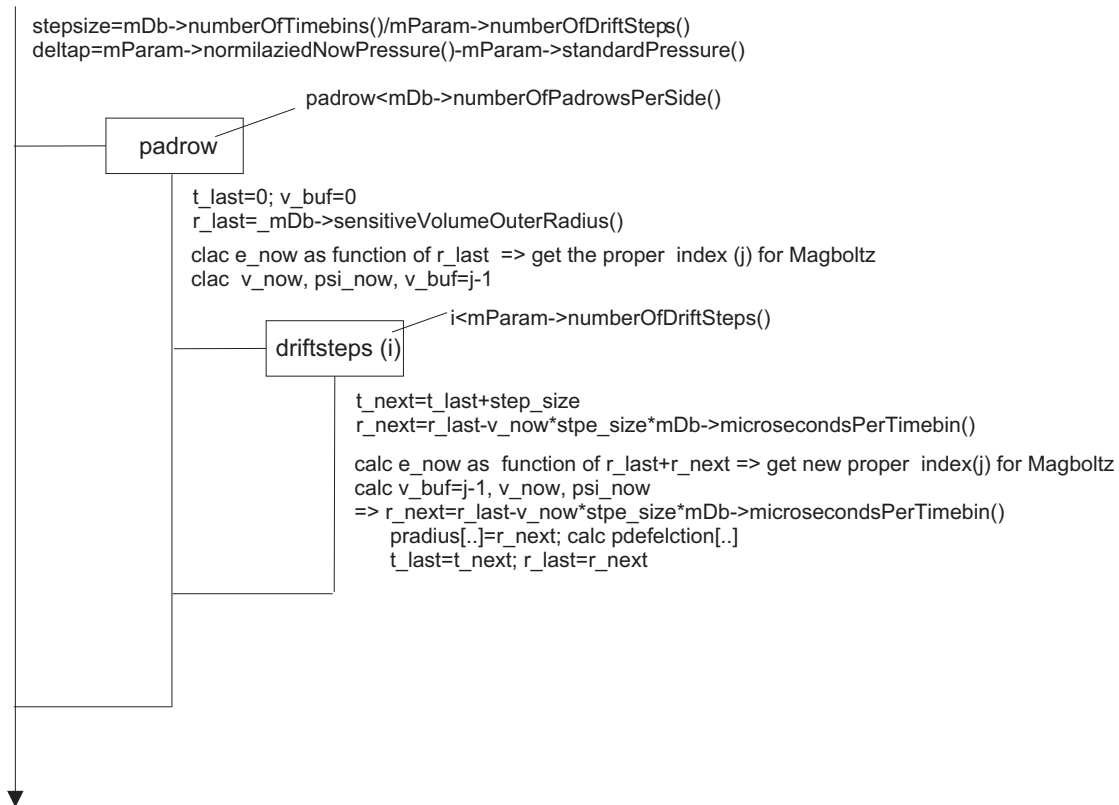
```
return iMake
```

# StFtpcClusterFinder::search()

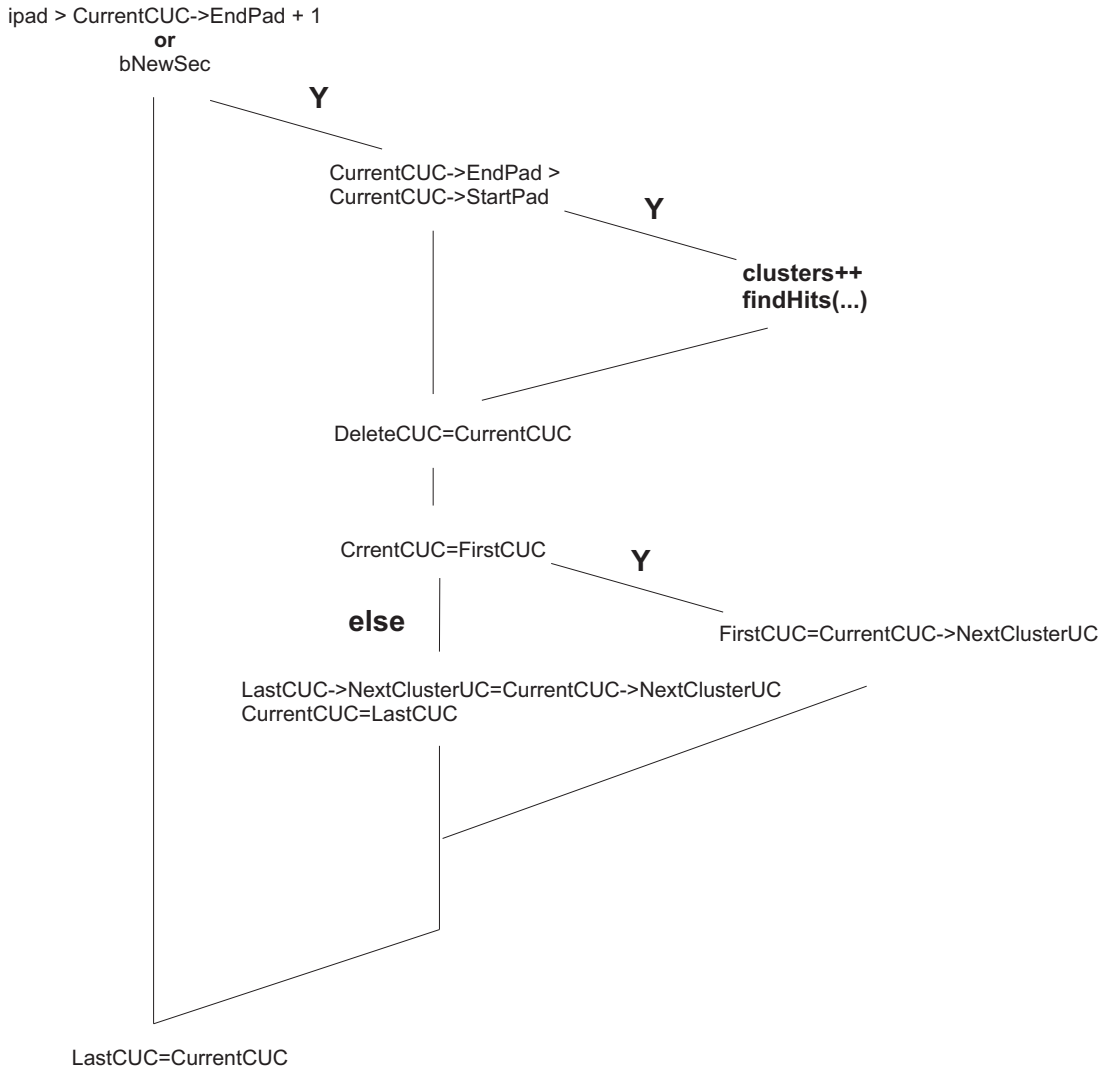


# StFtpcClusterFinder::calcpadtrans(...)

::calcpadtrans(double \*pradius, double \*pdeflection)



# 1 StFtpcClusterFinder::search()



# 2 StFtpcClusterFinder::search()

```

    NewSeq[].startTimeBin >= OldSeq[].startTimeBin
    &
    NewSeq[].startTimeBin <= (Oldseq[].startTimeBin+OldSeq[].Length-1)
  
```

**or**

```

    (NewSeq[].startTimeBin+NewSeq.Length-1) >= OldSeq[].startTimeBin
    &
    (NewSeq[].startTimeBin+NewSeq.Length-1) <= (Oldseq[].startTimeBin+OldSeq[].Length-1)
  
```

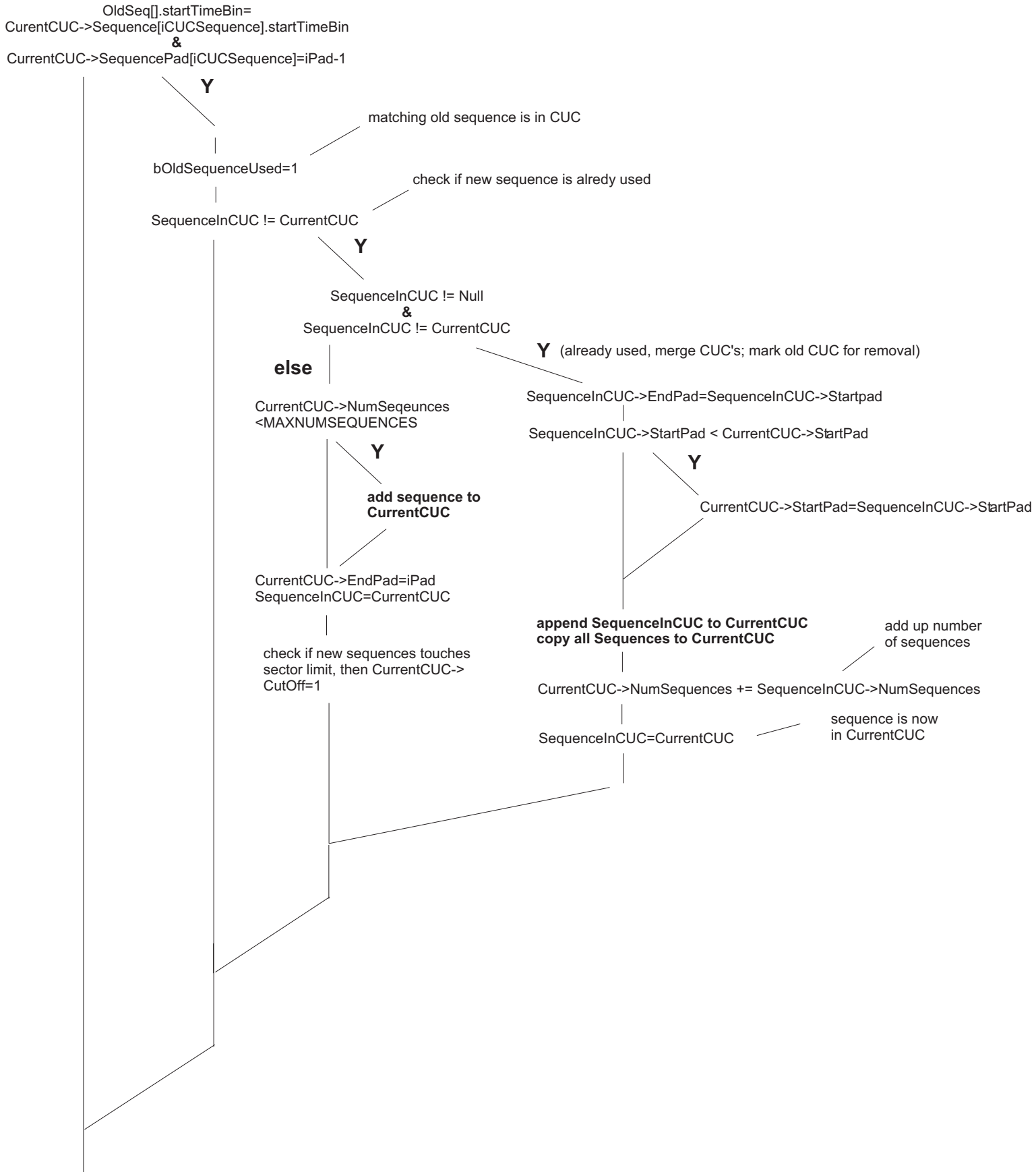
**or**

```

    OldSeq[].startTimeBin >= NewSeq[].startTimeBin
    &
    OldSeq[].startTimeBin <= (NewSeq[].startTimeBin+NewSeq.Length-1)
  
```

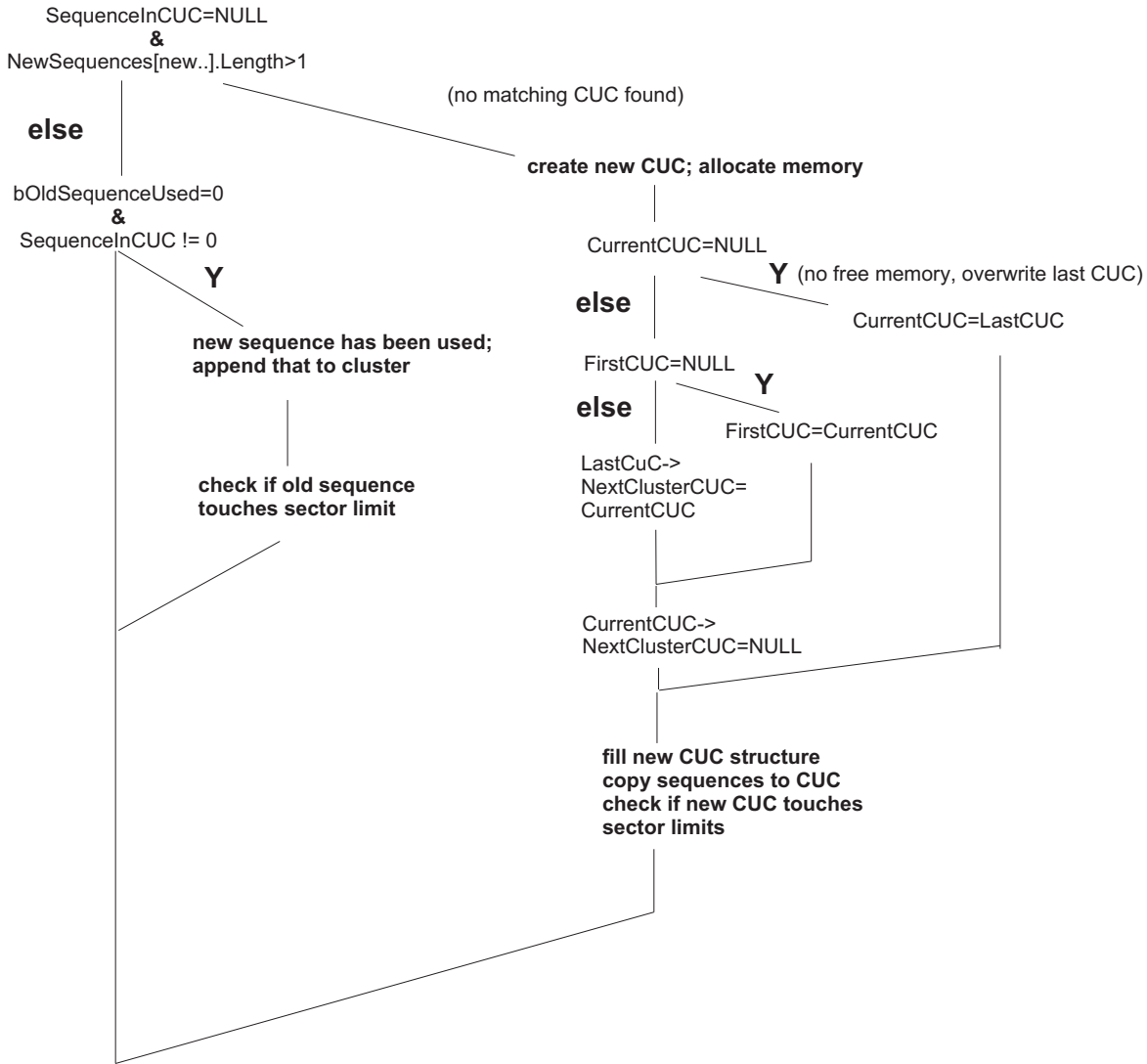
**(return true or false)**

### 3 StFtpcClusterFinder::search()

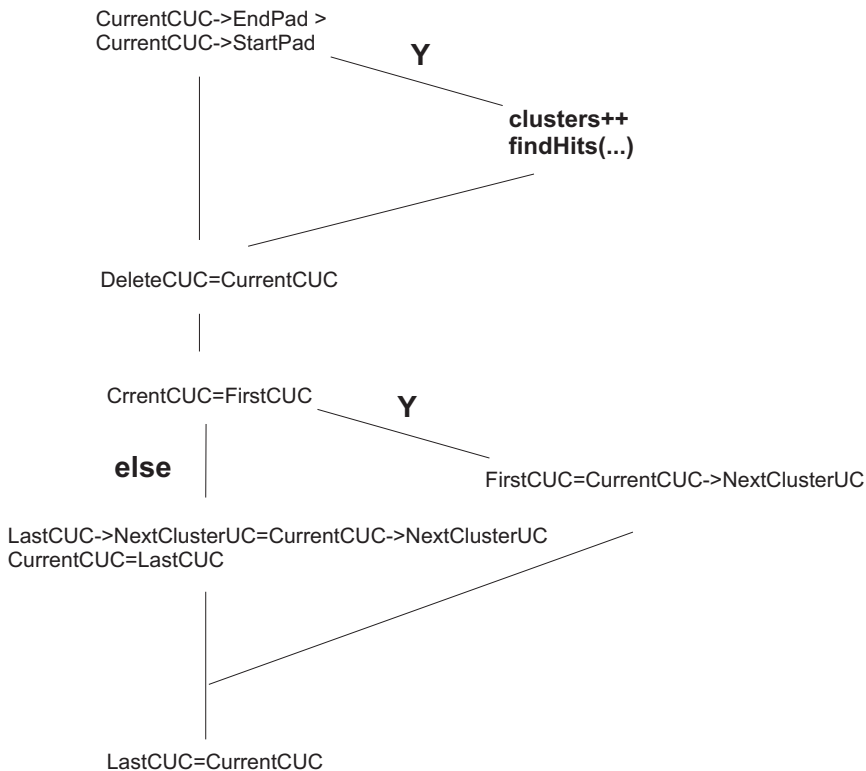




## 4 StFtpcClusterFinder::search()

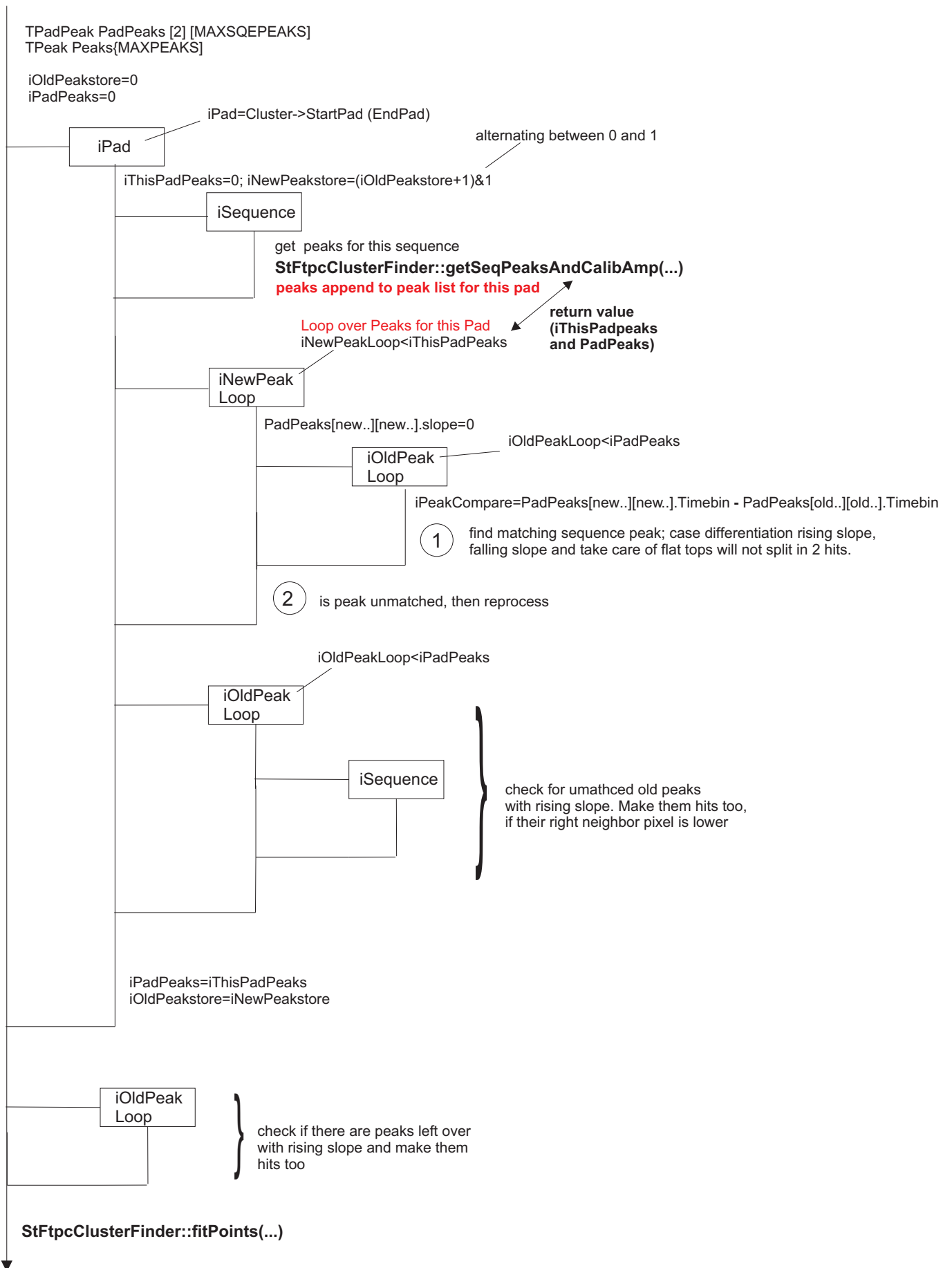


## 5 StFtpcClusterFinder::search()



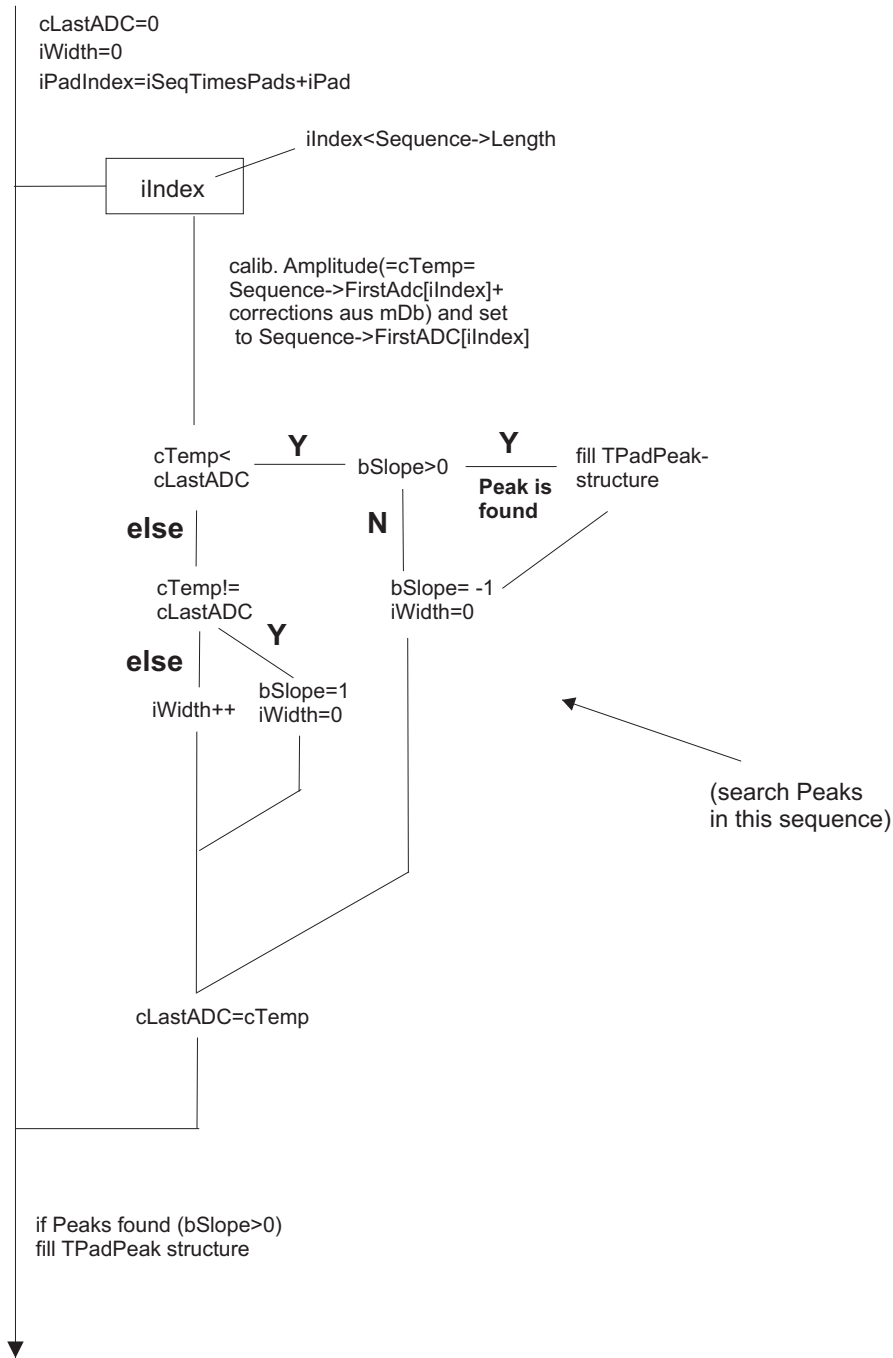
# StFtpcClusterFinder::findHits(...)

::findHits(TClusterUC \*Cluster, int iRow, int iSec, double \*pradius, double \*pdeflection, float fastlog[256])



# StFtpcClusterFinder::getSeqPeaksAndCalibAmp(...)

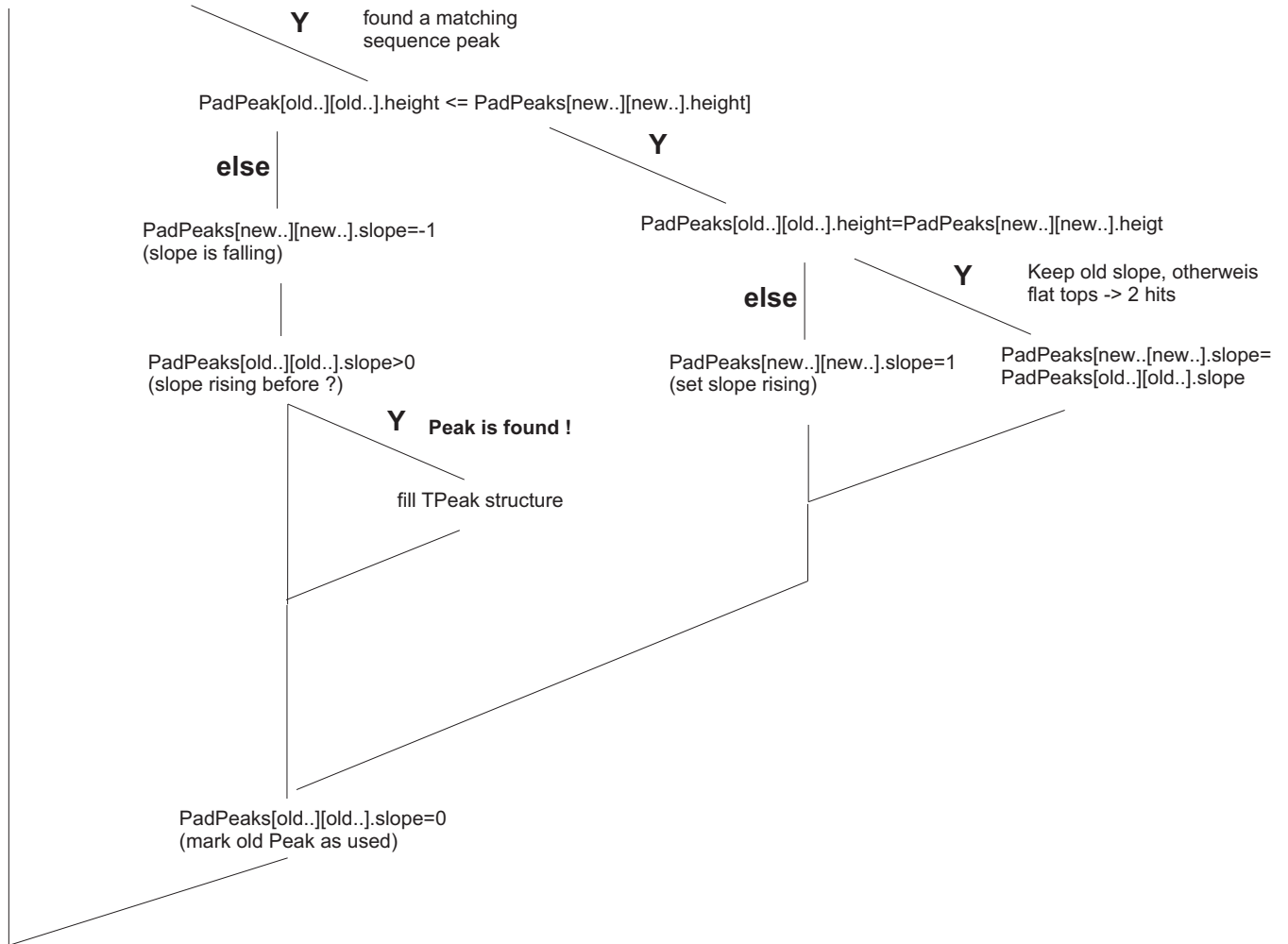
::getSeqPeaksAndCalibAmp(TPCSequence \*Sequence, int iRow, int iSeqTimesPads, int iPad, TPadPeak \*Peak, int \*pNumPeaks)



# 1 StFtpcClusterFinder::findHits(...)

`::findHits(TClusterUC *Cluster, int iRow, int iSec, double *pradius, double *pdeflection, float fastlog[256])`

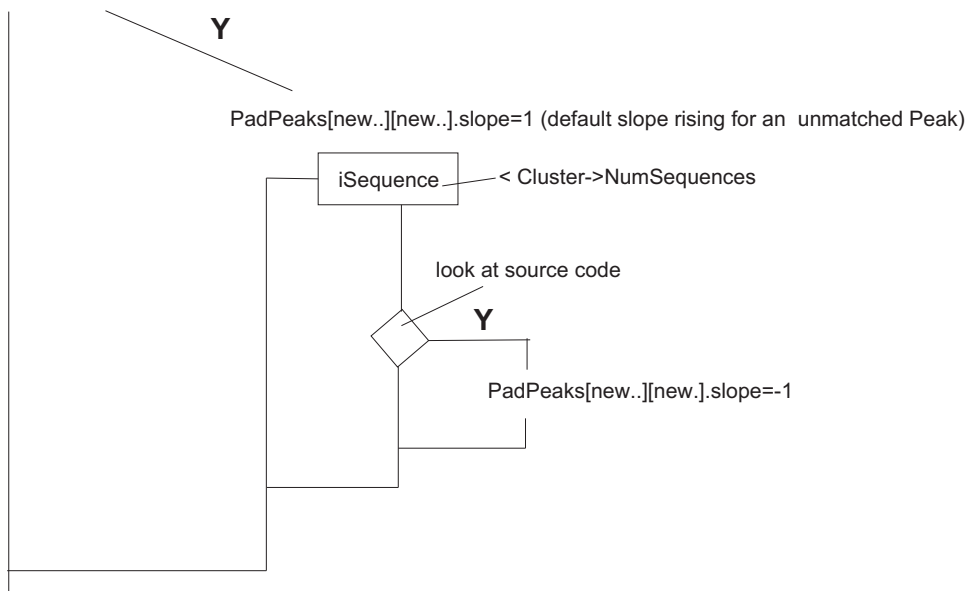
`iPeakCompare <= 1+PadPeaks[new..][new..].width & iPeakCompare >= 0`  
 or  
`iPeakCompare >= 1-PadPeaks[old..][old..].width & iPeakCompare <= 0`



# 2 StFtpcClusterFinder::findHits(...)

`::findHits(TClusterUC *Cluster, int iRow, int iSec, double *pradius, double *pdeflection, float fastlog[256])`

`PadPeaks[new..][new..].slope=0`



# StFtpcClusterFinder::fitPoints(...)

::fitPoints(TClusterUC \*Cluster, int iRow, int iSec, double \*pradius, double \*pdeflection, TPeak \*Peak, int iNumPeaks, float fastlog[256])

