# PostgresSQL Internal Roadmap v1.0   http://shenyu.wiki

## libpq

PQping()
PQconnectdb()
PQreset()
PQfinish()

PQexec()
PQprepare()
PQexecPrepared()
PQntuples()
PQnfields()
PQgetvalue()
PQprint()

features
----------
batch-row-model
singal-row-model
fast-path func call
synchronous
asynchronous
encoding
ssl
threadsafe
large-objects

## Postmaster process

src/backend/main.c::main()
PostmasterMain()
ServerLoop()
  for (;;)
  {
    port = ConnCreate()
    BackendStartup(port)
  }
                              reset_shared()

SysLogger_Start()
StartCheckpointer()
StartBackgroundWriter()
StartWalWriter()
StartAutoVacLauncher()
pgstat_start()
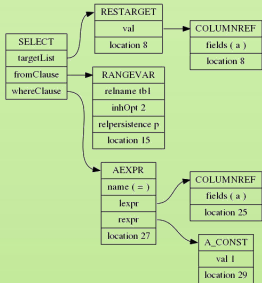pgarch_start()

3.fork()        1.mmap()        2.fork()

## Postgres process

src/backend/tcop/postgres.c::PostgresMain()
pqsignal()
BaseInit()
InitProcess()
InitPostgres()
    InitProcessPhase2()
    RelationCacheInitialize()
    InitCatalogCache()
    InitPlanCache()
    PerformAuthentication(MyProcPort);
    ....
process_session_preload_libraries()
for (;;)
{
    firstchar = ReadCommand(&input_message)
    switch(firstchar) {
    case 'Q' : exec_simple_query()
    pg_parse_query()

Q: select a from tb1 where a = 1;

### parser
raw_parser()   scan.l gram.y

pg_analyze_and_rewrite()

### rewrite
pg_analyze_and_rewrite()
    parse_analyze()
        transformStmt()
    pg_rewrite_query()
        QueryRewrite()
            RewriteQuery()
            fireRIRrules()

pg_plan_queries()

### optimizer

#### 1. prep
subquery_planner()
pull_up_sublinks()
inline_set_return..()
pull_up_subqueries()
flatten_simple_uni..()
preprocess_expre..()
reduce_outer_joins()
grouping_planner()
query_planner()

#### 2. plan
create_plan()
    create_plan_recurse()
        create_scan_plan()
        create_join_plan()

#### 3. path
make_one_rel()
    set_base_rel_sizes()
    set_base_rel_pathlists()
    make_rel_from_joinlist()

PortalRun()

### executor
ExecutorRun()
    standard_Execu..()
        ExecutePlan()
            ExecProcNode()

#### execSeq
ExecSeqScan()
ExecScan()
SeqNext()

#### execIndex
ExecIndexScan()
ExecScan()
IndexNext()

### Parse tree nodes

SELECT
targetList
fromClause
whereClause

RESTARGET
val
location 8

COLUMNREF
fields ( a )
location 8

RANGEVAR
relname tb1
inhOpt 2
relpersistence p
location 15

AEXPR
name ( = )
lexpr
rexpr
location 27

COLUMNREF
fields ( a )
location 25

A_CONST
val 1
location 29

### Query tree nodes

QUERY
commandType 1
canSetTag true
rtable
jointree
targetList

RTE
eref
relid 16384
relkind r
inh true
inFromCl true
requiredPerms 2
insertedCols (b)
updatedCols (b)

ALIAS
aliasname tb1
colnames ( a )

FROMEXPR
fromlist
quals

RANGETBLREF
rtindex 1

OPEXPR
opno 96
opfuncid 65
opresulttype 16
args
location 27

TARGETENTRY
expr
resno 1
resname a
resorigtbl 16384
resorigcol 1

VAR
varno 1
varattno 1
vartype 23
vartypmod -1
varnoold 1
varoattno 1
location 25

VAR
varno 1
varattno 1
vartype 23
vartypmod -1
varnoold 1
varoattno 1
location 8

CONST
consttype 23
consttypmod -1
constlen 4
constbyval true
location 29
constvalue 4 [ 1 0 0 0 0 0 0 0 ]

### Plan tree nodes

PLANNEDSTMT
commandType 1
canSetTag true
planTree
rtable
rewindPlanIDs (b)
relationOids (o 16384)

SEQSCAN
total_cost 35.50
plan_width 4
targetlist
qual
extParam (b)
allParam (b)
scanrelid 1

RTE
eref
relid 16384
relkind r
inh true
inFromCl true
requiredPerms 2
insertedCols (b)
updatedCols (b)

TARGETENTRY
expr
resno 1
resname a
resorigtbl 16384
resorigcol 1

OPEXPR
opno 96
opfuncid 65
opresulttype 16
args
location 26

ALIAS
aliasname tb1
colnames ( a )

VAR
varno 1
varattno 1
vartype 23
vartypmod -1
varnoold 1
varoattno 1
location 7

VAR
varno 1
varattno 1
vartype 23
vartypmod -1
varnoold 1
varoattno 1
location 24

CONST
consttype 23
consttypmod -1
constlen 4
constbyval true
location 28
constvalue 4 [ 1 0 0 0 0 0 0 0 ]

## shared memory

SpinlockSem
HashIndexShmem
BufferShmem
LockShmem
PredicateLockShmem
ProcGlobalShmem
XLOGShmem
CLOGShmem
CommitTsShmem
SUBTRANSShmem
TwoPhaseShmem
BackgroundWorkerShmem
MultiXactShmem
LWLockShmem
ProcArrayShmem
BackendStatusShmem
SInvalShmem
PMSignalShmem
ProcSignalShmem
CheckpointerShmem
AutoVacuumShmem
ReplicationSlotsShmem
ReplicationOriginShmem
WalSndShmem
WalRcvShmem
SnapMgrShmem
BTreeShmem
SyncScanShmem
AsyncShmem

## mmgr

TopMemoryContext
PostmasterContext
CacheMemoryContext
MessageContext
TopTransactionContext
CurTransactionContext
PortalContext
ErrorContext
---------------------
MemoryContextCreate()
MemoryContextSwitchTo()
palloc()
pfere()

## Cache

attoptcache.c
catcache.c
evtcache.c
inval.c
lsyscache.c
plancache.c
relcache.c
relfilenodemap.c
relmapper.c
spccache.c
syscache.c
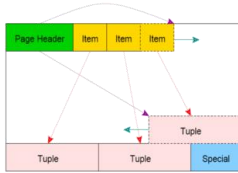ts_cache.c
typcache.c

## check pointer

## Walwriter

## backgroundWriter

## AutoVaccum

## pgStat

## pgArch

## access

### heap
relation_open
relation_openrv
relation_close
heap_open
heap_openrv
heap_close
heap_beginscan
heap_rescan
heap_endscan
heap_getnext
heap_fetch
heap_insert
heap_multi_insert
heap_delete
heap_updateheap_sync

## index
index_open
index_close
index_beginscan
index_beginscan_bitmap
index_rescan
index_endscan
index_insert
index_markpos
index_restrpos
index_getnext_tid
index_fetch_heap
index_getnext
index_getbitmap
index_bulk_delete
index_vacuum_cleanup

## transactions

/  StartTransactionCommand;
/     StartTransaction;
1) <   ProcessUtility;          << BEGIN
\      BeginTransactionBlock;
 \  CommitTransactionCommand;

/  StartTransactionCommand;
2) <   PortalRunSelect;         << SELECT ...
\  CommitTransactionCommand;
 \     CommandCounterIncrement;

/  StartTransactionCommand;
3) <   ProcessQuery;            << INSERT ...
\  CommitTransactionCommand;
 \     CommandCounterIncrement;

/  StartTransactionCommand;
4) <   ProcessUtility;          << COMMIT
\      EndTransactionBlock;
 \  CommitTransactionCommand;
  \    CommitTransaction;

## XLog
XLogBeginInsert()
XLogRegisterBuffer()
XLogRegisterBuffer()
XLogRegisterData()
XLogRegisterBufData()
XLogInsert()

## storage

### buffer
ReadBuffer
ReleaseBuffer
MarkBufferDirty

BufferGetPage
FlushBuffer

### page
PageIsValid
PageIsNew
PageGetItemId
PageGetItem
PageGetMaxOffset
Number
PageGetLSN
PageSetLSN
PageAddItem

### smgr
smgr_init
smgr_shutdown
smgr_close
smgr_create
smgr_exists
smgr_unlink
smgr_extend
smgr_read
smgr_write
smgr_nblocks
smgr_truncate
smgr_sync

### file
vfile
------
PathNameOpenFile
OpenTemporaryFile
FileRead
FileWrite
FileSync
AllocateFile
AllocateDir,
OpenPipeStream
OpenTransientFile

### lmgr
1. spinlock
2. LWLock
3. RegulrLocks
4. SIReadLock
5. deadlock detect

### ipc
1. dynamic shm
2. latch
3. signal
4. procarry
5. shm msg queue
5. shm toc

## OS

### file system
------------
open close
read write

### memory
------------

### process
------------

### network
------------

A module

A process