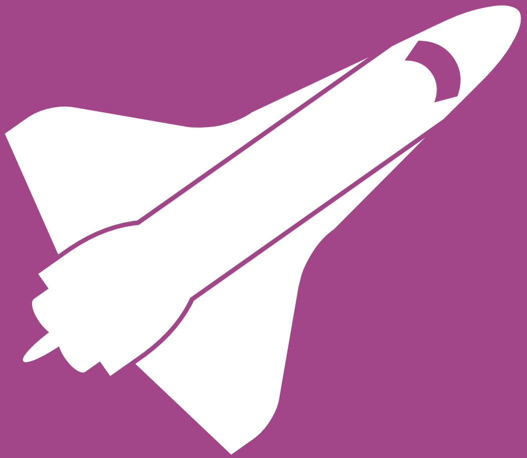


High Performance Odoo

Olivier Dony

@odony

Odoo can handle large data and transaction volumes out of the box!

On Odoo Online, a typical server hosts more than 3000 instances

» 100/200 new ones/day

odoo

Typical size of large deployments

- Multi-GB database (10-20GB)
- Multi-million records tables
  - Stock moves
  - Journal items
  - Mails / Leads

➔ On a single Odoo server!

Performance issues

can be (easily) solved

🔧 With the right **tools**

☑ And the right **facts**

Odoo Performance

1. Some Facts
2. Deployment Architecture
3. Monitor & Measure
4. Analyze
5. Top 5 Problems in Custom Apps

Some Facts

PostgreSQL

- Is the real workhorse of your Odoo server
- Powers large cloud services
- Can handle terabytes of data efficiently
- Should be fine-tuned to use your hardware

- Cannot magically fix algorithmic/complexity issues in [y]our code!

Hardware Sizing

- 2014 recommandation for single user server for up to ~100 active users
  - Intel Xeon E5 2.5Ghz 6c/12t (e.g. E5-1650v2)
  - 32GB RAM
  - SATA/SAS RAID-1
- On Odoo online, this spec handles 3000 dbs with a *load average* ≤ 3

Transaction Sizing

- Typical *read* transaction takes ~100ms
- A single process can handle ~6 t/s
- 8 worker processes = ~50 t/s
- 1 interactive user = ~50 t/m peak = ~1 t/s
- Peak use with 100 users = 100 t/s
- On average, 5-10% of peak = 5-10 t/s

SQL numbers

- Most complex SQL queries should be under 100ms, and the simplest ones < 5ms
- RPC *read* transactions: <40 queries
- RPC *write* transactions: 200+ queries
- One DB transaction = 100-300 heavy locks

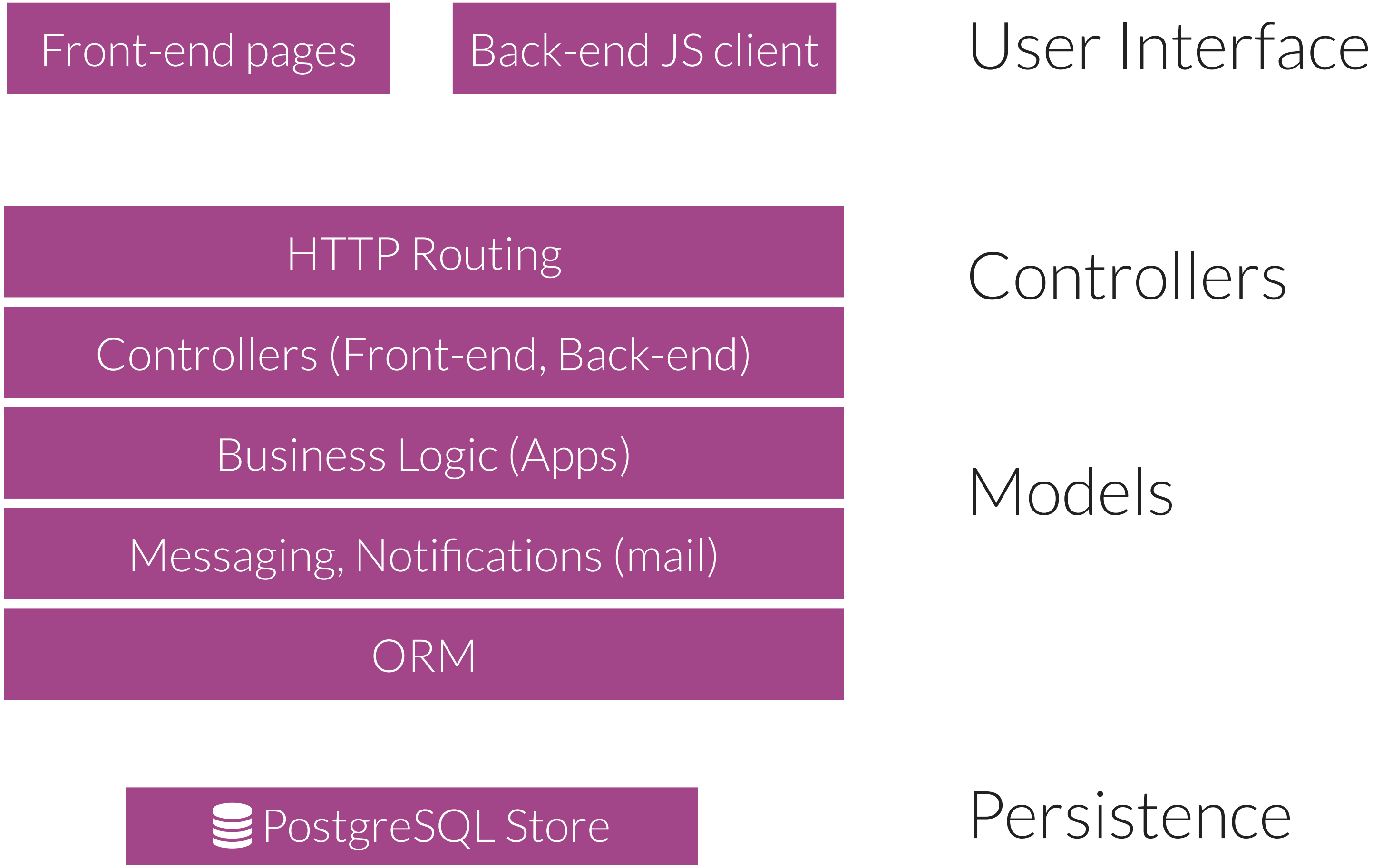
Sizing

For anything else, appropriate load testing is a **must** before going live!

Then size accordingly...

Deployment

Odoo Architecture



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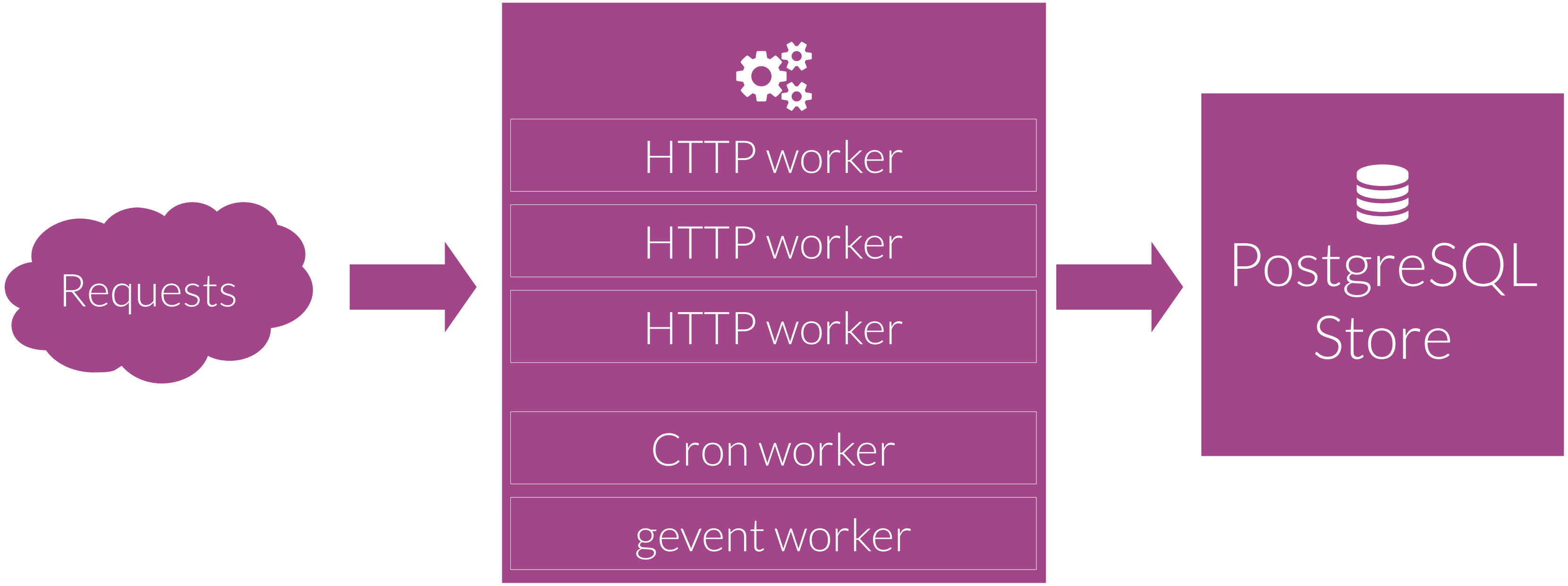
Deployment Architecture

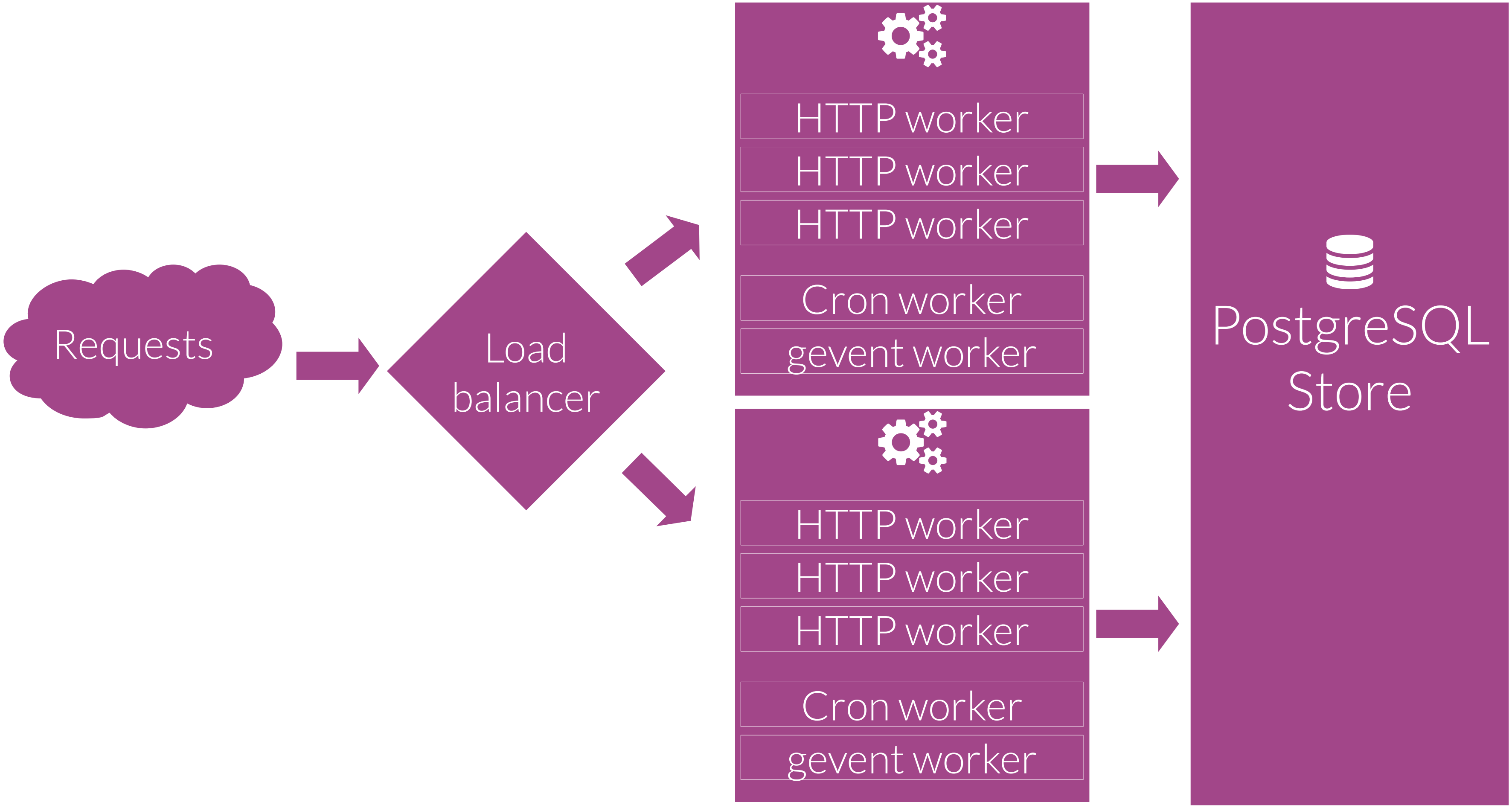
Single server, multi-process



Rule of thumb: --workers=$[1+$CORES*2]

Deployment Architecture

Multi-server, multi-process



PostgreSQL Deployment

- Use PostgreSQL 9.2/9.3 for performance
- Tune it: http://wiki.postgresql.org/wiki/Tuning_Your_PostgreSQL_Server
- Avoid deploying PostgreSQL on a VM
- If you must, optimize the VM for IOPS
  - Check out vFabric vPostgres 9.2
  - Use separate disks for SYSTEM/DATA/WAL
  - shared_buffers: more than 55% VM RAM
  - Enable guest memory ballooning driver

Monitor
& Measure

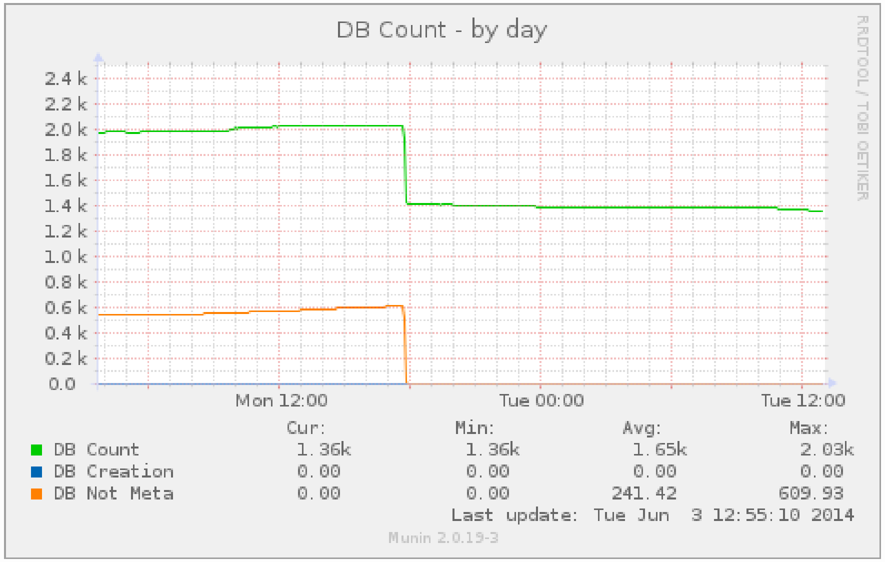
“ You cannot improve what you cannot measure! ”

Monitor & Measure

- Get the pulse of your deployments
  - System load
  - Disk I/O
  - Transactions per second
  - Database size
- Recommended tool: munin
  - --log-level=debug_rpc in Production!

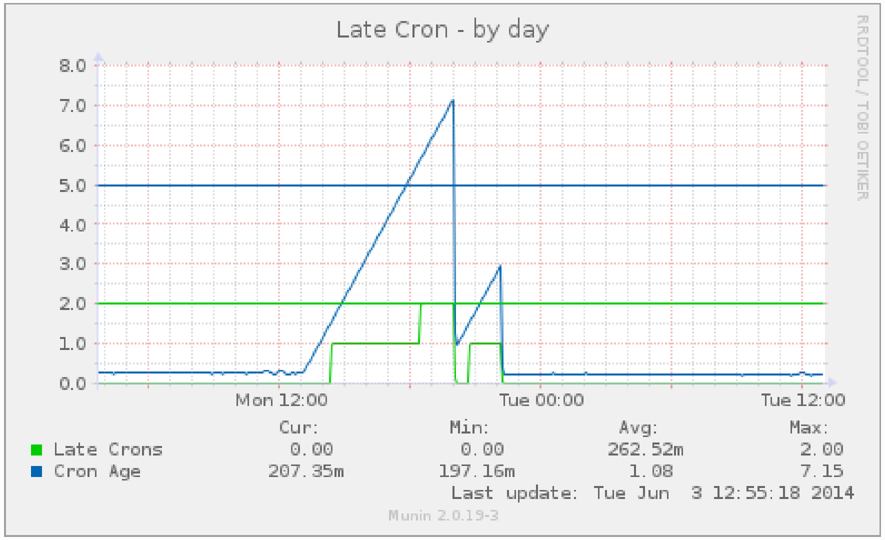
```
2014-05-03 12:22:32,846 9663 DEBUG test openerp.netsvc.rpc.request:
object.execute_kw time:0.031s mem: 763716k -> 763716k (diff: 0k)('test', 1,
'*', 'sale.order', 'read', (...), {...})
```

Monitor & Measure



	Cur:	Min:	Avg:	Max:
🟩 DB Count	1.36k	1.36k	1.65k	2.03k
🟦 DB Creation	0.00	0.00	0.00	0.00
🟧 DB Not Meta	0.00	0.00	241.42	609.93

Last update: Tue Jun 3 12:55:10 2014



	Cur:	Min:	Avg:	Max:
🟩 Late Crons	0.00	0.00	262.52m	2.00
🟦 Cron Age	207.35m	197.16m	1.08	7.15

Last update: Tue Jun 3 12:55:18 2014

- Build your munin dashboard
- Establish what the “usual level of performance” is
- Add your own specific metrics
- It will be invaluable later, even if you don't know yet

Munin plugin for transactions/minute

```
    #!/bin/sh
    #%# family=manual
    #%# capabilities=autoconf suggest

    case $1 in
        autoconf)
            exit 0
            ;;
        suggest)
            exit 0
            ;;
        config)
            echo graph_category openerp
            echo graph_title openerp rpc request count
            echo graph_vlabel num requests/minute in last 5 minutes
            echo requests.label num requests
            exit 0
            ;;
    esac
    # watch out for the time zone of the logs => using date -u for UTC timestamps
    result=$(tail -60000 /var/log/odoo.log | grep  "object.execute_kw time" | awk "BEGIN{count=0} (\$1 \" \"
\$2) >= \"`date +'%F %H:%M:%S' -ud '5 min ago'`\" { count+=1; } END{print count/5}")

    echo "requests.value ${result}"
    exit 0
```

Munin plugin for response time

```
    #!/bin/sh
    #%# family=manual
    #%# capabilities=autoconf suggest

    case $1 in
        config)
            echo graph_category openerp
            echo graph_title openerp rpc requests min/average response time
            echo graph_vlabel seconds
            echo graph_args --units-exponent -3
            echo min.label min
            echo min.warning 1
            echo min.critical 5
            echo avg.label average
            echo avg.warning 1
            echo avg.critical 5
            exit 0
            ;;
    esac
   # watch out for the time zone of the logs => using date -u for UTC timestamps
   result=$(tail -60000 /var/log/openerp.log | grep  "object.execute_kw time" | awk "BEGIN{sum=0;count=0} (\
$1 \" \" \$2) >= \"`date +'%F %H:%M:%S' -ud '5 min ago'`\" {split(\$8,t,\":\");time=0+t[2];if (min==\"\")
{ min=time}; sum += time; count+=1; min=(time>min)?min:time } END{print min, sum/count}")

    echo -n "min.value "
    echo ${result} | cut -d" " -f1
    echo -n "avg.value "
    echo ${result} | cut -d" " -f2
    exit 0
```

Monitor PostgreSQL

- Munin has many builtin plugins (enabled with symlinks)
- Enable extra logging in postgresql.conf
  - log_min_duration_statement = 50
    - Set to 0 to log all queries
    - Instagram gist to capture sample + analyze
  - lc_messages = 'C'
    - For automated log analysis

Analyze

Analysis – Where to start?

- Many factors can impact performance
  - Hardware bottlenecks (check munin graphs!)
  - Business logic burning CPU
    - use `kill -3 ${odoo_pid}` for live traces
  - Transaction locking in the database
  - SQL query performance

Analysis – SQL Logs

- Thanks to extra PostgreSQL logging you can use pg_badger to analyze the query log
- Produces a very insightful statistical report
- Use EXPLAIN ANALYZE to check the behavior of suspicious queries
  - Keep in mind that PostgreSQL uses the fastest way, not necessarily the one you expect (e.g. indexes not always used if sequential scan is faster)

PostgreSQL Analysis

- Important statistics tables
  - pg_stat_activity: real-time queries/transactions
  - pg_locks: real-time transaction *heavy* locks
  - pg_stat_user_tables: generic use stats for tables
  - pg_statio_user_tables: I/O stats for tables

Analysis – Longest tables

```
# SELECT schemaname || '.' || relname as table, n_live_tup as
num_rows
  FROM pg_stat_user_tables
  ORDER BY n_live_tup DESC LIMIT 10;

                   table                      num_rows

  public.stock_move                             179544
  public.ir_translation                         134039
  public.wkf_workitem                            97195
  public.wkf_instance                            96973
  public.procurement_order                       83077
  public.ir_property                             69011
  public.ir_model_data                           59532
  public.stock_move_history_ids                  58942
  public.mrp_production_move_ids                 49714
  public.mrp_bom                                 46258
```

Analysis – Biggest tables

```
# SELECT nspname || '.' || relname AS "table",
    pg_size_pretty(pg_total_relation_size(C.oid)) AS
"total_size"
  FROM pg_class C
  LEFT JOIN pg_namespace N ON (N.oid = C.relnamespace)
  WHERE nspname NOT IN ('pg_catalog', 'information_schema')
    AND C.relkind <> 'i'
    AND nspname !~ '^pg_toast'
  ORDER BY pg_total_relation_size(C.oid) DESC
  LIMIT 10;
```

```
            table              | total_size
-------------------------------+------------
 public.stock_move             | 525 MB
 public.wkf_workitem           | 111 MB
 public.procurement_order      | 80 MB
 public.stock_location         | 63 MB
 public.ir_translation         | 42 MB
 public.wkf_instance           | 37 MB
 public.ir_model_data          | 36 MB
 public.ir_property            | 26 MB
 public.ir_attachment          | 14 MB
 public.mrp_bom                | 13 MB
```

Reduce database size

- Enable filestore for attachments (see FAQ)
- No files in binary fields, use the filestore
- ✓ Faster dumps and backups
- ✓ Filestore easy to rsync for backups too

Analysis – Most read tables

```
# SELECT schemaname || '.' || relname as table, heap_blks_read as disk_reads,
heap_blks_hit as cache_reads,
         heap_blks_read + heap_blks_hit as total_reads
  FROM pg_statio_user_tables
  ORDER BY heap_blks_read + heap_blks_hit DESC LIMIT 15;
```

table	disk_reads	cache_reads	total_reads
public.stock_location	53796	60926676388	60926730184
public.stock_move	208763	9880525282	9880734045
public.stock_picking	15772	4659569791	4659585563
public.procurement_order	156139	1430660775	1430816914
public.stock_tracking	2621	525023173	525025794
public.product_product	11178	225774346	225785524
public.mrp_bom	27198	225329643	225356841
public.ir_model_fields	1632	203361139	203362771
public.stock_production_lot	5918	127915614	127921532
public.res_users	416	115506586	115507002
public.ir_model_access	6382	104686364	104692746
public.mrp_production	20829	101523983	101544812
public.product_template	4566	76074699	76079265
public.product_uom	18	70521126	70521144
public.wkf_workitem	129166	67782919	67912085

Analysis – Most written tables

```
# SELECT schemaname || '.' || relname as table,
         seq_scan,idx_scan,idx_tup_fetch+seq_tup_read lines_read_total,
         n_tup_ins as num_insert,n_tup_upd as num_update,
         n_tup_del as num_delete
  FROM pg_stat_user_tables ORDER BY n_tup_upd DESC LIMIT 10;
```

```
           table                   seq_scan   idx_scan   lines_read_total  num_insert  num_update  num_delete

public.stock_move                   1188095  1104711719      132030135782      208507     9556574       67298
public.procurement_order             226774    22134417       11794090805       92064     6882666       27543
public.wkf_workitem                     373    17340039          29910699     1958392     3280141     1883794
public.stock_location              41402098   166316501      516216409246          97     2215107         205
public.stock_picking                 297984    71732467        5671488265        9008     1000966        1954
public.stock_production_lot          190934    28038527        1124560295        4318      722053           0
public.mrp_production                270568    13550371         476534514        3816      495776        1883
public.sale_order_line                30161     4757426          60019207        2077      479752         320
public.stock_tracking                656404    97874788        5054452666        5914      404469           0
public.ir_cron                       246636         818           2467441           0      169904           0
```

Analysis – Locking (9.1)

```
-- For PostgreSQL 9.1
create view pg_waiter_holder as
      select
           wait_act.datname,
           pg_class.relname,
           wait_act.usename,
           waiter.pid as waiterpid,
           waiter.locktype,
           waiter.transactionid as xid,
           waiter.virtualtransaction as wvxid,
           waiter.mode as wmode,
           wait_act.waiting as wwait,
           substr(wait_act.current_query,1,30) as wquery,
           age(now(),wait_act.query_start) as wdur,
           holder.pid as holderpid,
           holder.mode as hmode,
           holder.virtualtransaction as hvxid,
           hold_act.waiting as hwait,
           substr(hold_act.current_query,1,30) as hquery,
           age(now(),hold_act.query_start) as hdur
     from pg_locks holder join pg_locks waiter on (
          holder.locktype = waiter.locktype and (
          holder.database, holder.relation,
          holder.page, holder.tuple,
          holder.virtualxid,
          holder.transactionid, holder.classid,
          holder.objid, holder.objsubid
     ) is not distinct from (
          waiter.database, waiter.relation,
          waiter.page, waiter.tuple,
          waiter.virtualxid,
          waiter.transactionid, waiter.classid,
          waiter.objid, waiter.objsubid
     ))
     join pg_stat_activity hold_act on (holder.pid=hold_act.procpid)
     join pg_stat_activity wait_act on (waiter.pid=wait_act.procpid)
     left join pg_class on (holder.relation = pg_class.oid)
     where holder.granted and not waiter.granted
     order by wdur desc;
```

Analysis – Locking (9.2)

```
-- For PostgreSQL 9.2
create view pg_waiter_holder as
      select
           wait_act.datname,
           wait_act.usename,
           waiter.pid as wpid,
           holder.pid as hpid,
           waiter.locktype as type,
           waiter.transactionid as xid,
           waiter.virtualtransaction as wvxid,
           holder.virtualtransaction as hvxid,
           waiter.mode as wmode,
           holder.mode as hmode,
           wait_act.state as wstate,
           hold_act.state as hstate,
           pg_class.relname,
           substr(wait_act.query,1,30) as wquery,
           substr(hold_act.query,1,30) as hquery,
           age(now(),wait_act.query_start) as wdur,
           age(now(),hold_act.query_start) as hdur
     from pg_locks holder join pg_locks waiter on (
          holder.locktype = waiter.locktype and (
          holder.database, holder.relation,
          holder.page, holder.tuple,
          holder.virtualxid,
          holder.transactionid, holder.classid,
          holder.objid, holder.objsubid
     ) is not distinct from (
          waiter.database, waiter.relation,
          waiter.page, waiter.tuple,
          waiter.virtualxid,
          waiter.transactionid, waiter.classid,
          waiter.objid, waiter.objsubid
     ))
     join pg_stat_activity hold_act on (holder.pid=hold_act.pid)
     join pg_stat_activity wait_act on (waiter.pid=wait_act.pid)
     left join pg_class on (holder.relation = pg_class.oid)
     where holder.granted and not waiter.granted
     order by wdur desc;
```

Analysis – Locking

- Verify blocked queries

```
# SELECT * FROM waiter_holder;

 relname | wpid  | hpid  |      wquery                      | wdur             | hquery
---------+-------+-------+----------------------------------+------------------+------------------------------
         | 16504 | 16338 | update "stock_quant" set "s      | 00:00:57.588357  | <IDLE> in transaction
         | 16501 | 16504 | update "stock_quant" set "f      | 00:00:55.144373  | update "stock_quant"
(2 lignes)          ...      hquery                   | hdur                |   wmode    |    hmode       |
                    ... ------------------------------+--------------------+-----------+---------------|
                    ... <IDLE> in transaction         | 00:00:00.004754    | ShareLock | ExclusiveLock |
                    ... update "stock_quant" set "s   | 00:00:57.588357    | ShareLock | ExclusiveLock |
```

- Update to PostgreSQL 9.3 is possible
  - More efficient locking for Foreign Keys
- Try pg_activity (top-like): `pip install pg_activity`

Top 5 Problems in Custom Apps

Top 5 Problems in Custom Apps

- 1. Wrong use of stored computed fields
- 2. Domain evaluation strategy
- 3. Business logic triggered too often
- 4. Misuse of the batch API
- 5. Custom locking

1. Stored computed fields

- Be vary careful when you add stored computed fields (using the old API)
  - Manually set the right trigger fields + func

```
store = {'trigger_model': (mapping_function,
                          [fields...],
                          priority) }
store = True is a shortcut for:
        {self._name: (lambda s,c,u,ids,c: ids,
                      None,10)}
```

- ⚠ Do not add this on master data (products, locations, users, companies, etc.)

2. Domain evaluation strategy

- Odoo cross-object domain expressions do not use JOINs by default, to respect modularity and ACLs
- e.g. `search([('picking_id.move_ids.partner_id', '!=', False)])`
  - Searches all moves without partner!
  - Then uses " id IN <found_move_ids>"!
- Imagine this in *record rules* (global security filter)
- Have a look at auto_join (v7.0+)

```
'move_ids': fields.one2many('stock.move', 'picking_id',
        string='Moves', auto_join=True)
```

3. Busic logic triggered too often

- Think about it twice when you override create() or write() to add your stuff
  - How often will this be called? Should it be?
- Think again if you do it on a high-volume object, such as o2m line records (sale.order.line, stock.move, ...)
- Again, make sure you don't alter master data

4. Misuse of batch API

- The API works with batches
- Computed fields work in batches
- Model.browse() pre-fetches in batches
- See @one in the new API

5. Custom Locking

- In general PostgreSQL and the ORM do all the DB and Python locking we need
- Rare cases with manual DB locking
  - Inter-process mutex in db (ir.cron)
  - ~~Sequence numbers~~
  - ~~Reservations in double-entry systems~~
- Python locking
  - Caches and shared resources (db pool)
- You probably do not need more than this!

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Thank You

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