



FISL 16
16th International
FREE SOFTWARE FORUM
Technology that frees you

ZABBIX

Zabbix

Zabbix 3.0 and beyond



Who am I?

Alexei Vladishev

Creator of Zabbix

CEO, Architect and Product Manager

Twitter: [@avladishev](https://twitter.com/avladishev)

Email: alex@zabbix.com



What is my talk about?

- Past: look at the history
- Present: Zabbix 3.0
- Future



About Zabbix team

30 members working full-time

Offices in Riga (Headquarters), Tokyo and New-York

Business model is based on providing services:
technical support, trainings, development, turn-key
solutions

Very active community in many countries including
Brazil



What do we do?

- We develop **free** monitoring system you can trust
- Not limited to IT monitoring
- **Fanatical** about high quality and producing good code
- We care about post production maintenance



Past

Where Zabbix came from



History: 1998

Most important decisions

C language for the most critical parts

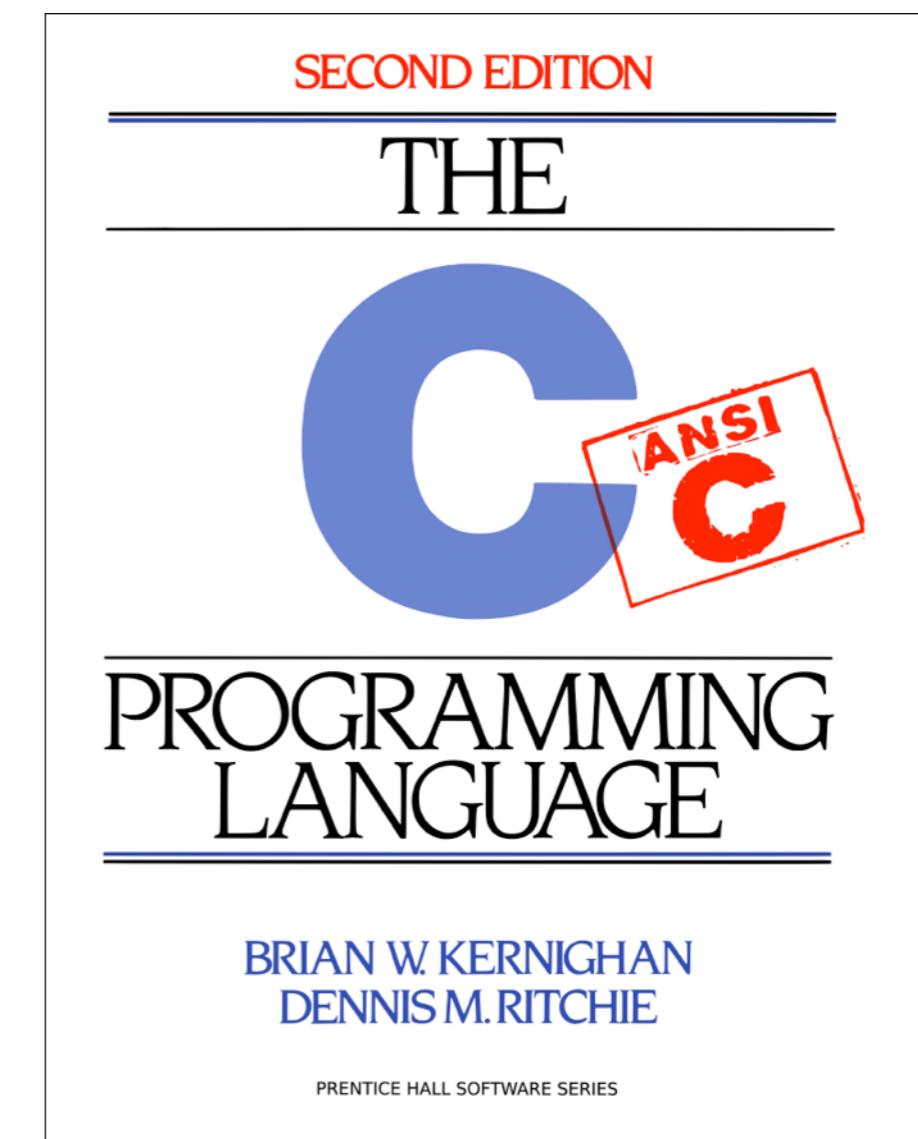
PHP language for the WEB interface

SQL back-end



C language

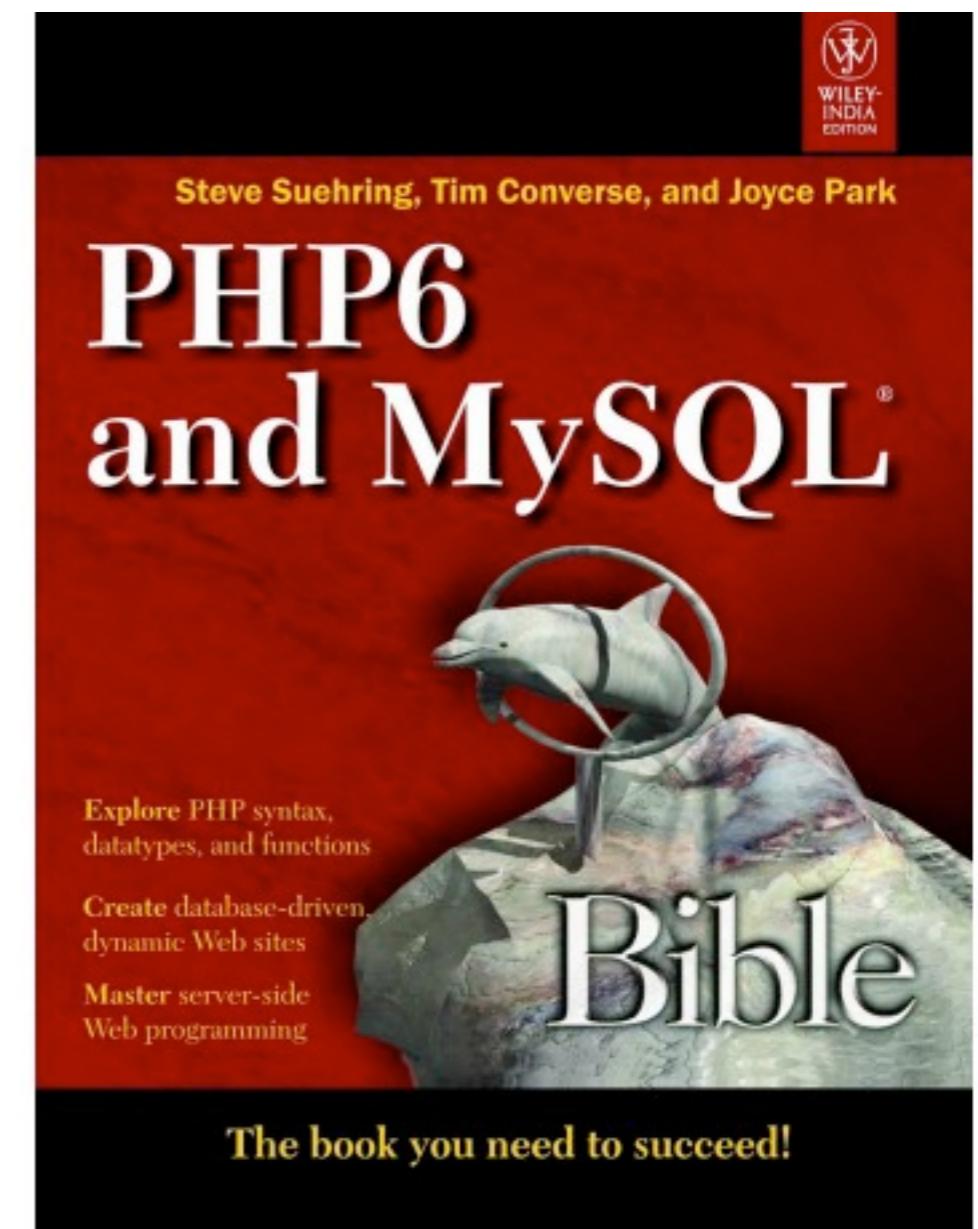
- + Very low level, close to the hardware
- + Efficient code: fast
- + Minimal usage of CPU and memory resources
- + Almost no dependencies
- + Write once, compile and run everywhere
- Slower development
- Potential problems with memory, locks, pointers





PHP language

- + Easy to start writing ~~bad code~~
- + Available on most platforms
- + Actively developed recently
- Dynamic typing
- Discipline is a must for good code
- Interpreted: errors during code execution





SQL back-end

- + MySQL, PostgreSQL, Oracle, DB2, SQLite
- + Transactions and data integrity
- + Standard API: SQL
- + Easy to deploy
- Scalability
- High availability and redundancy





Zabbix is an extremely compact application

```
alex@alex:/tmp/zabbix-2.4.0
alex@alex:/tmp/zabbix-2.4.0$ ls -l src/zabbix_server/zabbix_server
-rwxrwxr-x 1 alex alex 1391128 Sep 13 10:09 src/zabbix_server/zabbix_server
alex@alex:/tmp/zabbix-2.4.0$ ls -l src/zabbix_agent/zabbix_agentd
-rwxrwxr-x 1 alex alex 356800 Sep 13 10:09 src/zabbix_agent/zabbix_agentd
alex@alex:/tmp/zabbix-2.4.0$ █
```



Architecture: what's good

Separation of logic: data collection, problem detection, notifications, visualisation, API, etc

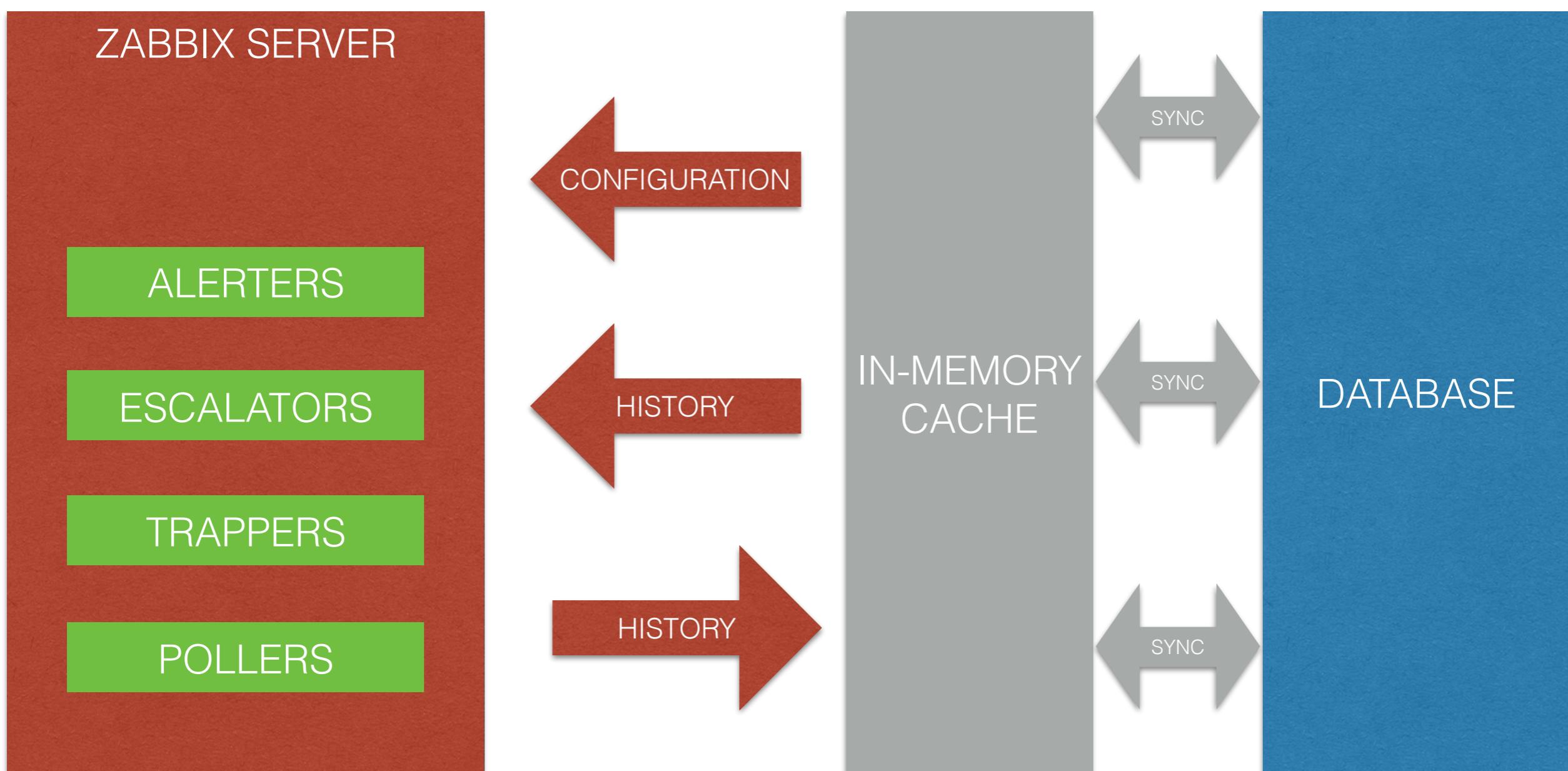
Multiprocess application: uses all available CPU cores

Data is always in consistent state



Optimisations

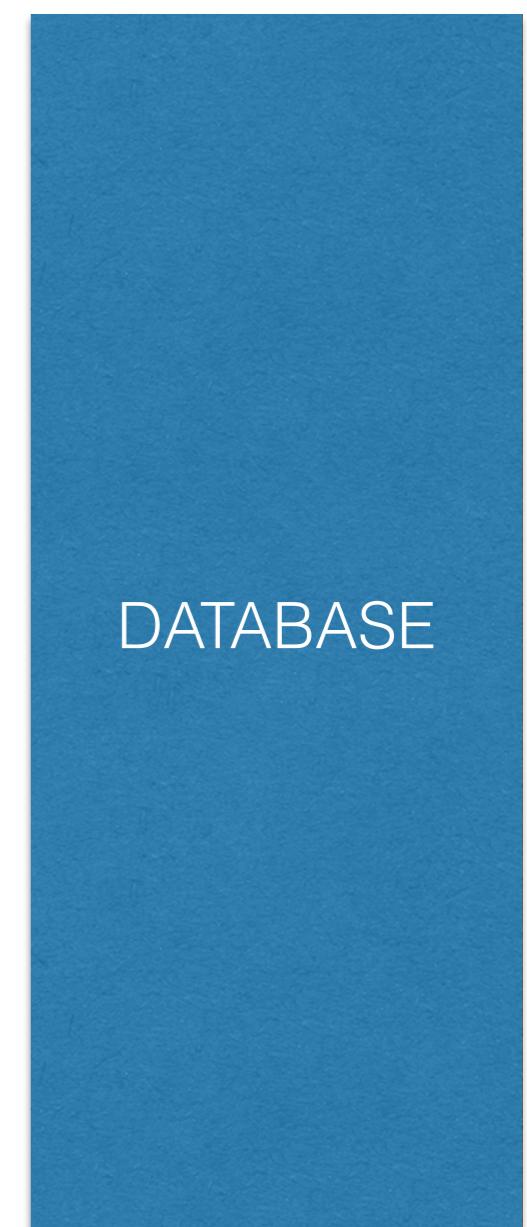
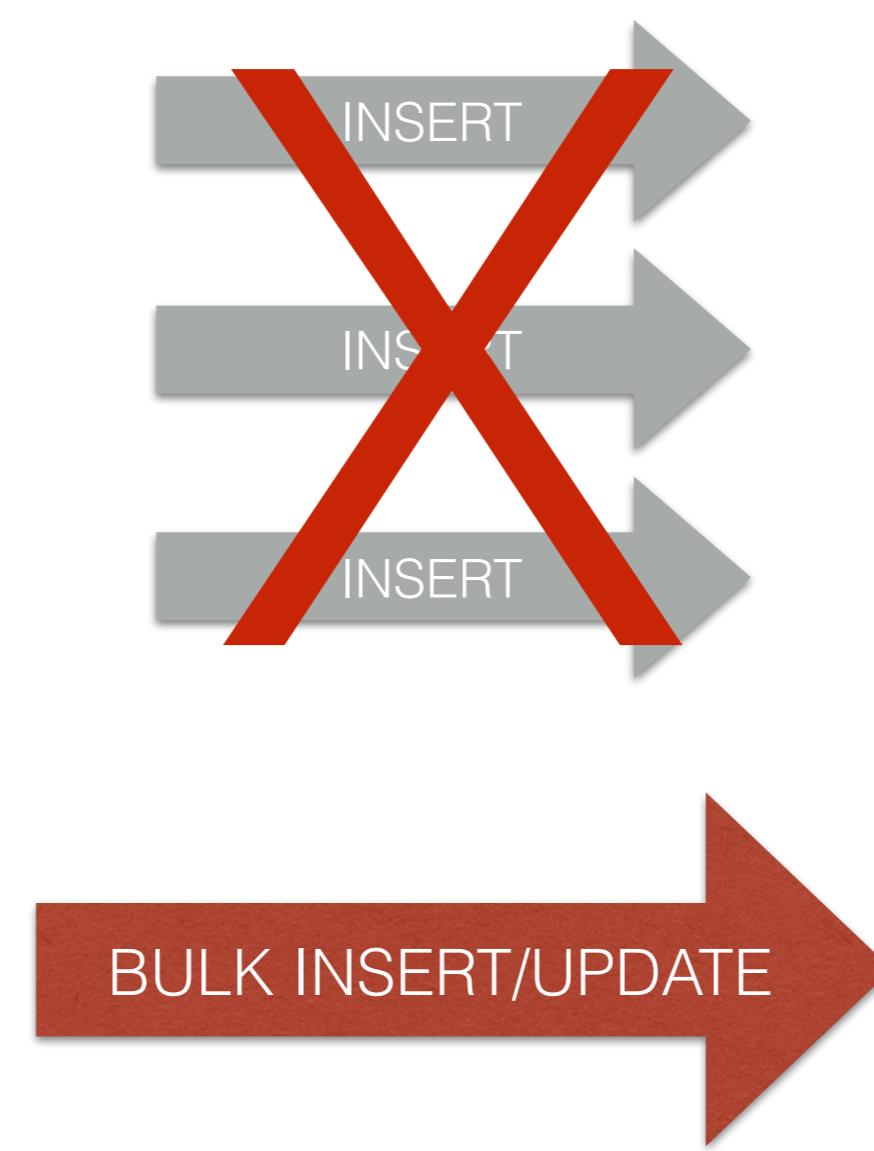
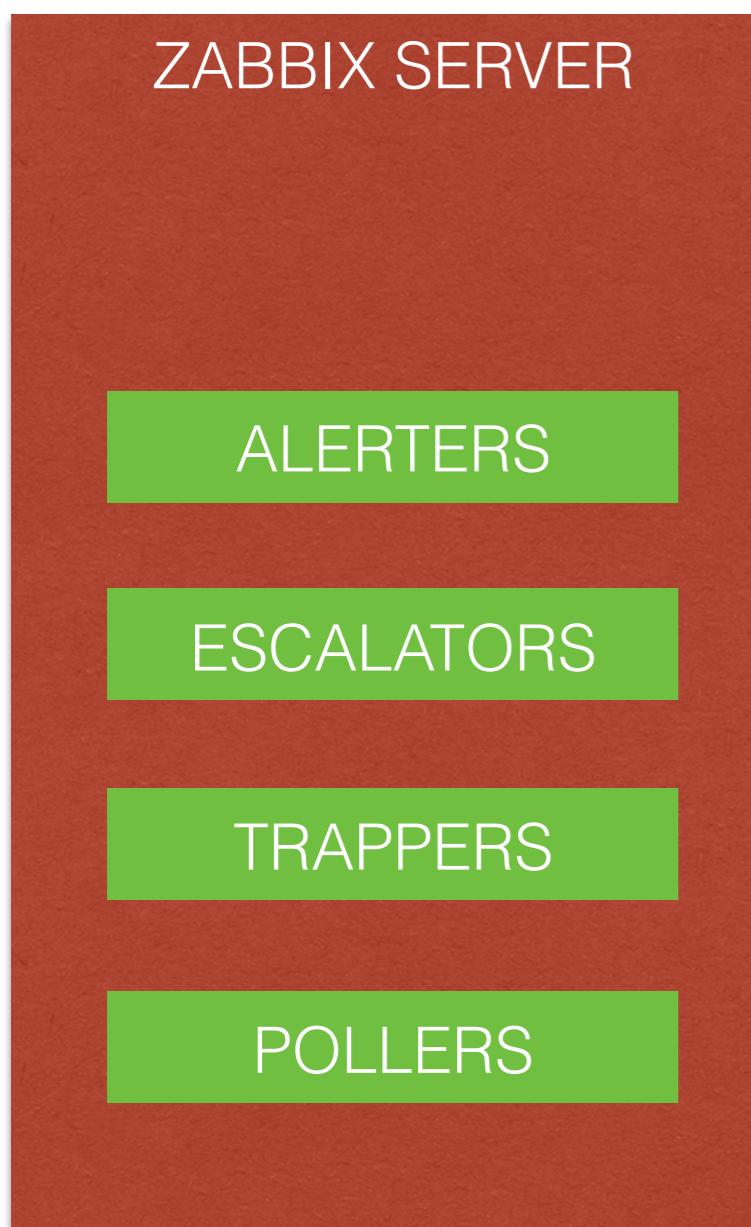
In-memory cache





Optimisations

Mass (bulk) operations





2015, any changes?

- Languages: no changes - C, PHP
- Much stricter development work-flow

Specification, development, code review, testing,
documentation, ready to ship

Coding guidelines

- Continuous integration
- Static analysers and commit hooks



Current challenges

- Different stack of technologies for back-end and front-end

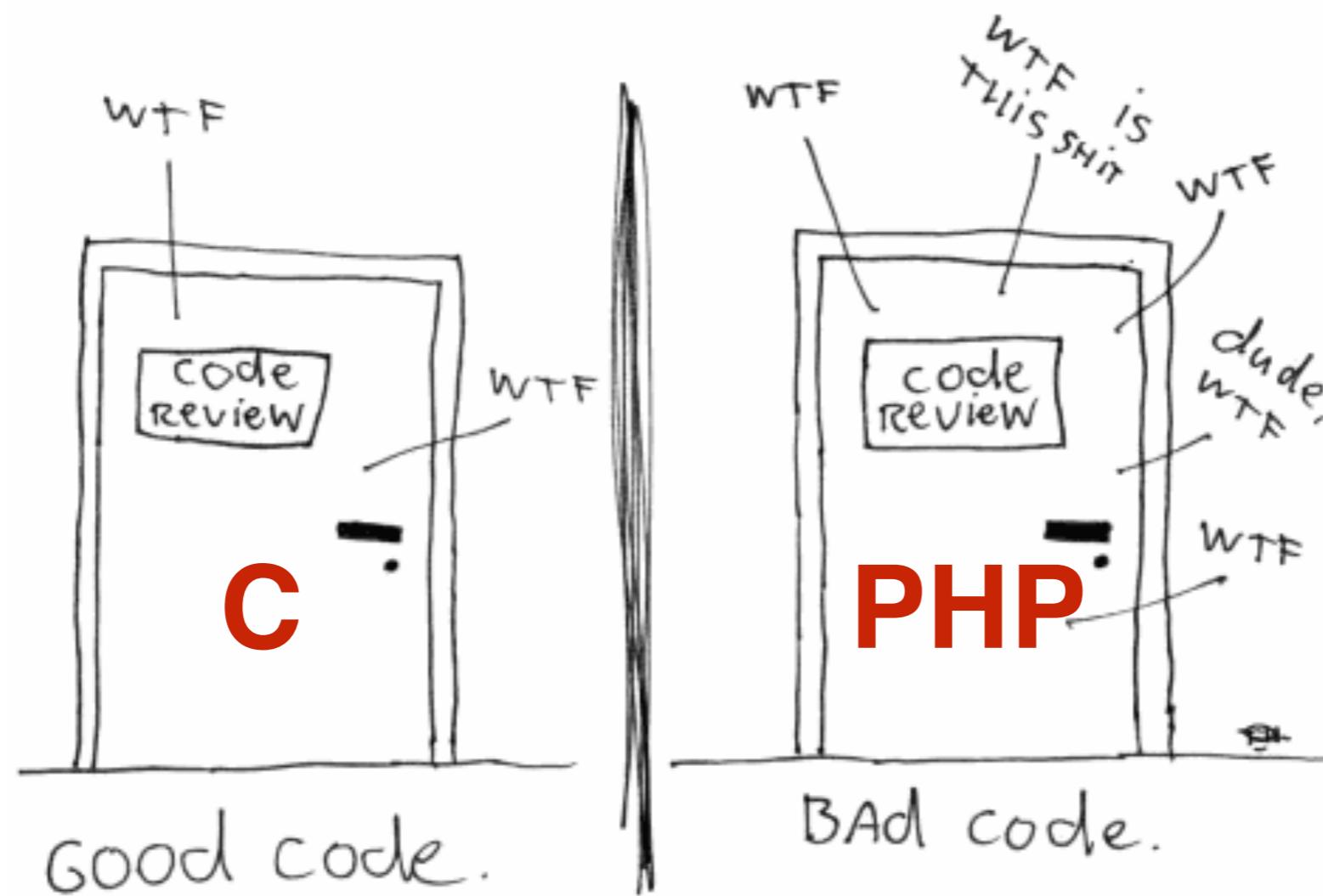
Team members with different skill set

- Speed of development
- Older historical code in PHP



Different quality of code

The ONLY VALID MEASUREMENT
OF Code QUALITY: WTFs/minute





Present

Working hard on Zabbix 3.0



Where is the roadmap?

Find in a search engine “zabbix roadmap”

<https://www.zabbix.org/wiki/Docs/roadmap>

Planned

Name	Issue	Specification	Comments
Ability to force polling of passive items and LLD rules	ZBXNEXT-473 ↗	ZBXNEXT-473	
Dependencies between trigger prototypes	ZBXNEXT-1229 ↗	ZBXNEXT-1229	
TLS and PSK encryption between Zabbix components	ZBXNEXT-1263 ↗	ZBXNEXT-1263	S
LLD macros in applications	ZBXNEXT-1219 ↗	ZBXNEXT-1219	A
XML versioning	ZBX-7654 ↗	ZBX-7654	A
Resolve user macros on host/template level	ZBXNEXT-210 ↗	ZBXNEXT-210	A
New design for the frontend	ZBXNEXT-2662 ↗	ZBXNEXT-2662	
Partially move the API to the server	ZBXNEXT-2519 ↗	ZBXNEXT-2519	
Show trigger description in popups in the dashboard's "last 20 issues"	ZBXNEXT-2678 ↗	ZBXNEXT-2678	J



Interface

Cleaner and better



Zabbix 1.8

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Updated: 02:45:41 AM

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Graphs »

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Zabbix 2.0

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Zabbix 2.2

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Zabbix 2.4

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No visible progress

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2009: Zabbix 1.8

2012: Zabbix 2.0

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JBoss Scripts	space on JBoss 302	Nov 12th, 2013 12:03:59 PM	1m 27d 14h	No		
vSphere Detect operating system	space on vSphere 004	Nov 12th, 2013 12:03:56 PM	1m 27d 14h	No		
vSphere Ping	space on vSphere 001	Nov 12th, 2013 12:03:53 PM	1m 27d 14h	No		
vSphere Traceroute	space on JBoss 303	Nov 12th, 2013 12:03:40 PM	1m 27d 14h	No		
vSphere Go to	space on vSphere 005	Nov 12th, 2013 12:03:37 PM	1m 27d 14h	No		
vSphere Latest data	space on vSphere 002	Nov 12th, 2013 12:03:34 PM	1m 27d 14h	No		
vSphere Host inventory	space on vSphere 001	Nov 12th, 2013 12:03:18 PM	1m 27d 14h	No		
vSphere Host screens	space on JBoss 301	Nov 12th, 2013 12:03:15 PM	1m 27d 14h	No		
vSphere 003	Lack of free swap space on vSphere 003	Nov 12th, 2013 11:48:30 AM	1m 27d 14h	No		
Zabbix server	Lack of free swap space on Zabbix server	Nov 12th, 2013 11:48:30 AM	1m 27d 14h	No		

10 of 10 issues are shown

Updated: 02:45:41 AM

2013: Zabbix 2.2

2014: Zabbix 2.4



It's time to fix it!

Zabbix 3.0



Zabbix 3.0: interface

Monitoring Inventory Reports Configuration Administration Share ? Profile Power

Dashboard Overview Web Latest data Triggers Events Graphs Screens Maps Discovery IT services

Dashboard

Graphs

Favourite graphs

- Zabbix server: CPU utilization
- Zabbix server: Memory usage

System status

HOST GROUP	DISASTER	HIGH	AVERAGE	WARNING	INFORMATION	NOT CLASSIFIED
Zabbix servers	0	0	1	2	0	0

Updated: 18:53:57

Host status

HOST GROUP	WITHOUT PROBLEMS	WITH PROBLEMS	TOTAL
Zabbix servers	0	1	1

Updated: 18:53:57

Favourite screens

- Zabbix server
 - Screens
 - Slide shows

Last 20 issues

HOST	ISSUE	LAST CHANGE	AGE	INFO	ACK	ACTIONS
Zabbix server	Zabbix discoverer processes more than 75% busy	2015-06-26 18:53:35	22s		No	
Zabbix server	Lack of free swap space on Zabbix server	2015-06-26 18:53:30	27s		No	
Zabbix server	Processor load is too high on Zabbix server	2015-06-26 18:53:16	41s		No	

3 of 3 issues are shown

Updated: 18:53:57

Web monitoring

HOST GROUP	OK	FAILED	UNKNOWN
	No data found		

Updated: 18:53:57

Favourite maps

- Local network

Discovery status

DISCOVERY RULE	UP	DOWN



Zabbix 3.0: interface

Monitoring Inventory Reports Configuration Administration Share ? User Power

Dashboard Overview Web Latest data Triggers Events Graphs Screens Maps Discovery IT services

Dashboard

Graphs

Favourite graphs

- Zabbix server: CPU utilization
- Zabbix server: Memory usage

System status

HOST GROUP	DISASTER	HIGH	AVERAGE	WARNING	INFORMATION	NOT CLASSIFIED
Zabbix servers	0	0	1	2	0	0

Updated: 18:54:19

Host status

HOST GROUP	WITHOUT PROBLEMS	WITH PROBLEMS	TOTAL
Zabbix servers	0	1	1

Updated: 18:54:19

Favourite screens

- Zabbix server

Last 20 issues

HOST	ISSUE	LAST CHANGE	AGE	INFO	ACK	ACTIONS
Zabbix server	Zabbix discoverer processes more than 75% busy	2015-06-26 18:53:35	44s		No	
Zabbix server	Lack of free swap space on Zabbix server	2015-06-26 18:53:30	49s		No	
Zabbix server	Processor load is too high on Zabbix server	2015-06-26 18:53:16	1m 3s		No	

3 of 3 issues are shown
Updated: 18:54:19

Web monitoring

HOST GROUP	OK	FAILED	UNKNOWN
	No data found		

Updated: 18:54:19

Favourite maps

- Local network

Discovery status

DISCOVERY RULE	UP	DOWN



Zabbix 3.0: interface

Monitoring Inventory Reports Configuration Administration Search Share ? User Power

Dashboard Overview Web Latest data Triggers Events Graphs Screens Maps Discovery IT services

Search: za

Hosts														
HOST	IP	DNS	LATEST DATA	TRIGGERS	EVENTS	GRAPHS	SCREENS	WEB	APPLICATIONS	ITEMS	TRIGGERS	GRAPHS	DISCOVERY	WEB
Zabbix server	127.0.0.1		Latest data	Triggers	Events	Graphs	Screens	Web	Applications 11	Items 63	Triggers 42	Graphs 10	Discovery 2	Web
Displaying 1 of 1 found														

Host groups							
HOST GROUP	LATEST DATA	TRIGGERS	EVENTS	GRAPHS	WEB	HOSTS	TEMPLATES
Zabbix servers	Latest data	Triggers	Events	Graphs	Web	Hosts 1	Templates
Displaying 1 of 1 found							

Templates							
TEMPLATE	APPLICATIONS	ITEMS	TRIGGERS	GRAPHS	SCREENS	DISCOVERY	WEB
Template App Zabbix Agent	Applications 11	Items 63	Triggers 42	Graphs 10	Screens 1	Discovery 2	Web
Template App Zabbix Proxy	Applications 11	Items 63	Triggers 42	Graphs 10	Screens 1	Discovery 2	Web
Template App Zabbix Server	Applications 11	Items 63	Triggers 42	Graphs 10	Screens 1	Discovery 2	Web
Displaying 3 of 3 found							



Interface: under the hood

- Modularity, MVC
- Ability to **create** your own pages

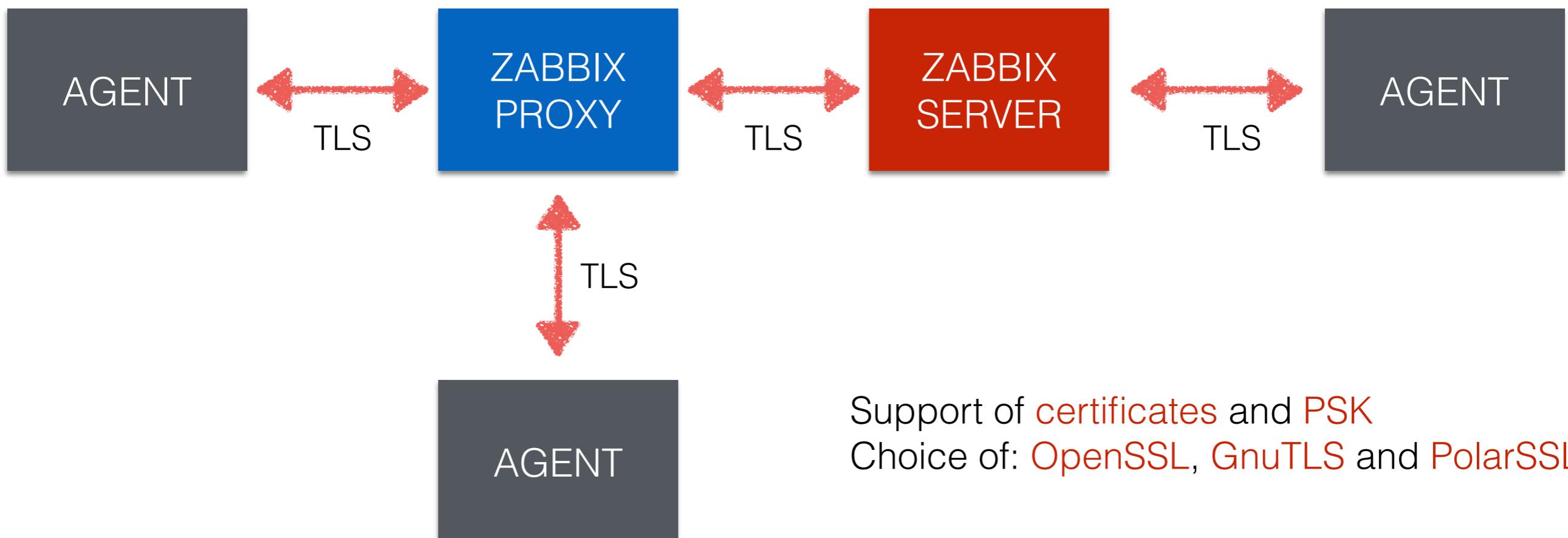
```
alex@dev:~/public_html/ZBXNEXT-2662-5/frontends/php$ ls app/  
controllers views  
alex@dev:~/public_html/ZBXNEXT-2662-5/frontends/php$ ls local/app/  
controllers views
```

- Ability to **extend** existing pages
- First attempts to create API for dashboard widgets



Encryption and authentication

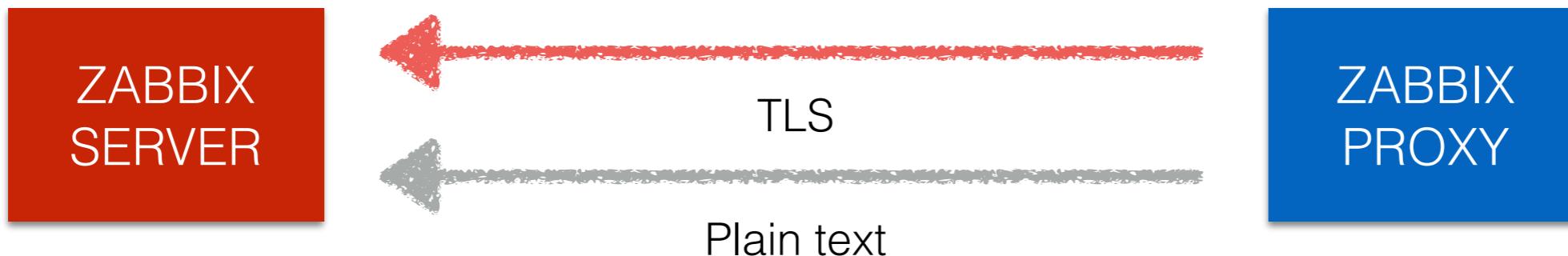
Strong encryption and authentication for all components based on **TLS v1.2**





Easy upgrade to better security

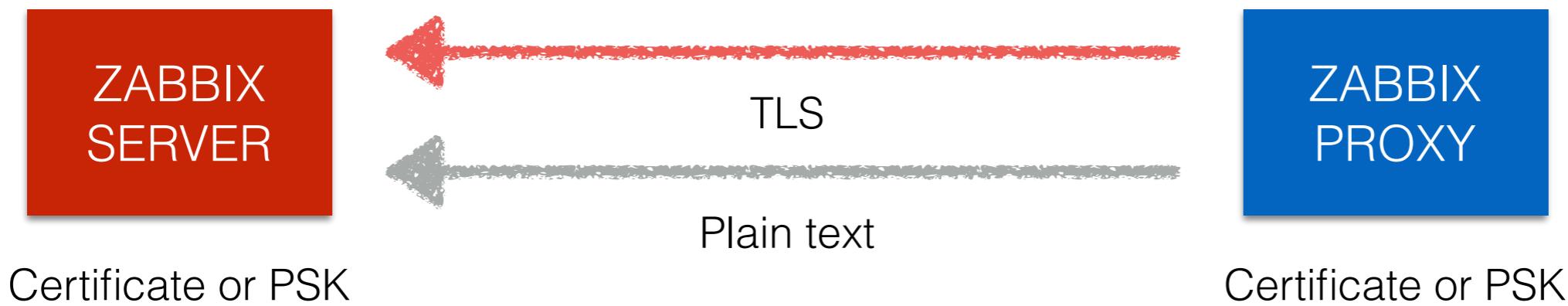
Step 1 Enable end-point to accept both encrypted and plain text communications





Easy upgrade to better security

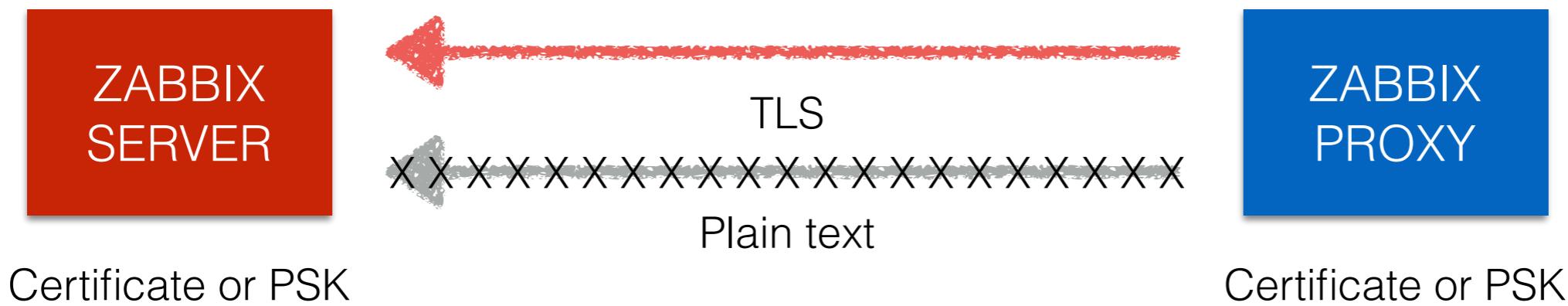
Step 2 Configure certificate or PSK based encryption and authentication





Easy upgrade to better security

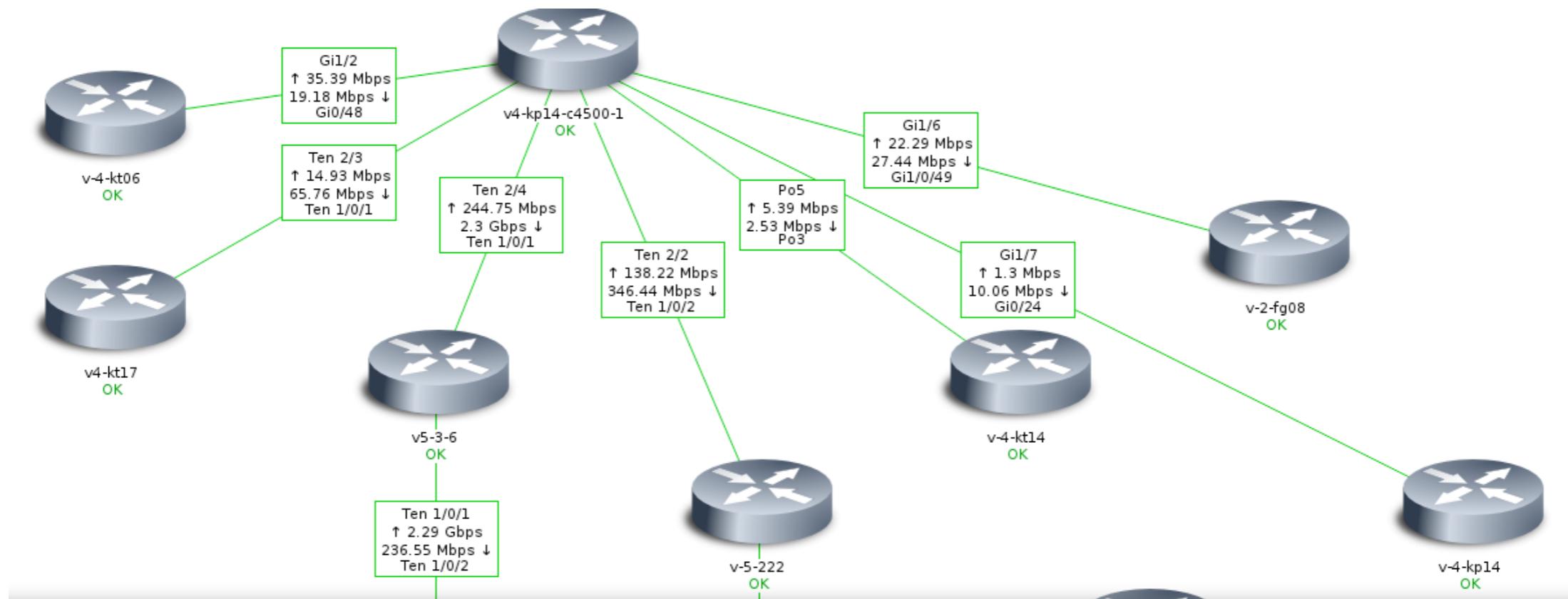
Step 3 Verify that TLS works and reject plain text connections





Personal resources

- Personal screens, maps and slide shows
- Ability to share with other user groups





Versioning for XML

- Versions for XML files
- Strong validation
- Backward compatibility
 - **Automatic** conversion from older versions





Context specific macros

`{$MACRO:context}`, if does not exist we use value of `{$MACRO}`

Example

`{$MINDISKSPACE:/tmp} => 50%`

`{$MINDISKSPACE:/db} => 30%`

`{$MINDISKSPACE} = 10%`

Not enough disk space

`{host:vfs.fs.size[{#FSNAME},pfree].last()} < {$MINDISKSPACE:{#FSNAME}}`



`{host:vfs.fs.size["/home",pfree].last()} < {$MINDISKSPACE:/home}`



“Ready for business” checks

Checks at a specific time:

every 2 hours starting from 9:00 (9:00, 11:00 ...)

every hour hh:00 и hh:30

working days only at 9:00

working days every hour at 9:00, 10:00, ..., 18:00

at first day of every month at 9:30

at first day of every month at 9:30 if it's Monday



Manual execution of housekeeper

For example, from crontab:

```
* 2 * * * /usr/local/sbin/zabbix_server -R housekeeper_execute
```



Low level discovery based on SQL queries

Retrieve data from external database

select field1,field2,field3 from table where ...

Use it to create new items, triggers, graphs

{#FIELD1}, {#FIELD2}, {#FIELD3}



Also

- Support of dependencies for trigger prototypes
- Support of IPv6 for Java gateway
- Triggers Top 100, filleting by: host, host group, severity and custom time period
- Support of TCP for DNS checks
- Discovery of any number of SNMP LLD values
ifDescr, ifOutOctets, ifInOctets using one query from different SNMP tables
- Dropdowns replaced by buttons for mass-actions
- Support of LLD macros in units and IMPI sensors



Zabbix 3.0: when?

Planned in May, 2015

Expected: September, 2015 (?)



Future

What I would like to improve in Zabbix

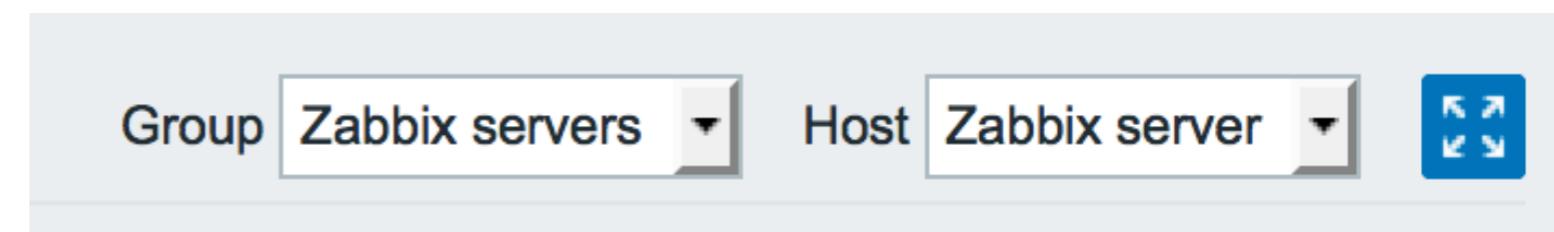


WEB interface: facts

- Existing navigation is no good: menu!
- Too many clicks for standard actions

“Click till death”, Lukas, Zabbix Conference 2014

- Information is not well inter-connected
Monitoring/Administration is strictly separated
- Drop downs: consume too much memory and CPU





WEB interface: make it better

- Improve user experience
- Object-oriented navigation

Choose host → All information about selected host
is one-click away

- Information should be interconnected
- Improve performance (depends on performance of API)



API: facts

- Can be very slow
- Generates too much queries to the database
- No strong validation
- Poor error reporting



API: faster and more reliable

- Make it **10-100x** faster
 - More efficient algorithms
 - Bulk operations and caching
- Make API **first class citizen**: possible move to Zabbix Server side

That's where we have the most efficient code

- Strong validation
- Detailed error reporting



Reports: facts

So much data in the database but:

- Poor reporting
- No analytics
- No way to **create** your own reports
- No way to **remember** report parameters for easy re-use



Reports: visualisation

Real-time an analytics





Scalability: facts

- Zabbix becomes **significantly** slower as data volume grows
- Requires special techniques for scalability (table partitioning)
- HA and redundancy is not trivial



Scalability: terrabytes!

- Horizontal scalability for data storage
 - Standard SQL engine cannot deliver it
- Separate storage for historical data
- New distributed monitoring
- Performance of the interface is important, **sub-second response time**



API and plugins: facts

Currently can be used only for extending agent- and server-side checks, notification methods.

It is not enough!



API and plugins

Support whenever possible

- New trigger functions
- Pre- and post-processing of data
- Dashboard widgets
- and more!



A few useful links



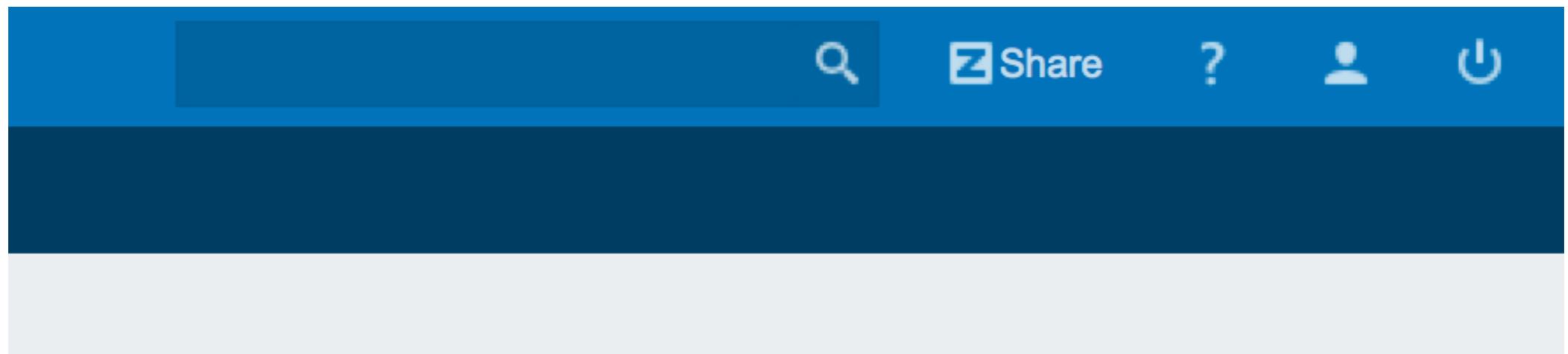
support.zabbix.com

Voting is a real opportunity to influence Zabbix functionality!

T	Zabbix ID	Key	Summary	Assignee	Reporter	Votes ↓
	ZBXNEXT-1229		Cannot define dependencies for trigger prototypes	Martins Valkovskis	Joseph Bueno	159
	NMR	ZBXNEXT-473	Ability to Check Now a specific passive item	Unassigned	Robert Hau	127
	NMR	ZBXNEXT-104	switch trigger to OK based on acknowledgement by user	Unassigned	David M. Zendzian	117
	RTD	ZBXNEXT-17	daemon communication encryption: psk	Unassigned	Szep csaba	113
	NMR	ZBXNEXT-927	Allow LLD Graphs to graph an item for each discovered entity in a single graph	Unassigned	Andrew Howell	111
	RTD	ZBXNEXT-46	Host based dependencies	Unassigned	Ankur Sethi	108



share.zabbix.com



Share!

- Templates
- Modules
- HOWTOs



Thank you!

twitter.com/zabbix



Please come to Zabbix booth! We have nice giveaways. :)