

ZABBIX conference 2012 / Riga

Günther Sommer IT Architect / "ZABIX Evangelist" Business Unit Integration Projects





ZABBIX and High Availability

- \rightarrow Marketing \odot Who are we
- \rightarrow Part I The problem
- → Part II The "standard" way- Clustering
- → Part III The "ZABBIX" way Distributed monitoring





Marketing ©

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→ FREQUENTIS is a partner of ZABBIX

 \rightarrow Using it as a monitoring solution for some of our systems

 \rightarrow Certified for an ED109 – AL3 environment (with RHEL)





Company Overview

- \rightarrow Established in 1947
- → 154 Mio. EUR Turnover 2010
- → Corporate headquarters in Vienna
 - Subsidiaries and regional offices in over 50 countries
- → about 980 Employees
- → Outstanding Engineering Capacity
 - more than 600 highly-qualified engineers (HW/SW/PM) at FREQUENTIS headquarter and subsidiaries
- → Export Quota > 90%
- \rightarrow R&D Quota > 12%



First Air Traffic Control System in Austria, Vienna / Schwechat, 1955



Breakthrough in the US: FAA Command Centre / Herndon, Virginia, 2003



Company Headquarters on Wienerberg, relocation in 2006

Global Market Leader in ATC Voice Communication Systems

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+ Frequentis Group 2010

FREQUENTIS Worldwide References

CANADA Equipment of Civil (7 ACCs, 78 TWRs) USA IVSR TWR and TRACON Programme for and Military (2 Centres, 7 TWRs) ATC, Migration [Excerpt 05/2011] FAA, FAA Conference Control Switch to European AIS Database (EAD) Chart Services; Maritime System for Canadian Coast Guard (ATCSCC), NASA Mission Operations Voice Enhancement (MOVE) Programme, several TWRs, smartATIS Systems, DSC Analysers FIII 2 Airports MEXICO More than 50 TWRs, 4 ACCs AUSTRALIA Continentwide VHF Network, Military Network, Deployable Air Operations Tower, and APPs, Nation wide MFC Network, TAS ICCS Parliamentary Services BERMUDA TWR CAYMAN ISLANDS TWR NEW ZEALAND 18 TWRs, ACC, Countrywide Voice and Data Network, Electronic Flight Strips, EAD/FR-AIS System NL ANTILLES ACC, Approach COLUMBIA Military ACC VORWAY 3 ACCs, APP, TWR, Emergency Voice Communication System, Network of 9 Coastal BRAZIL TWR, mobile and deployable TWRs Radio Stations, GSM-R for Norwegian Rail, 335 Control Rooms for Noednett PERU TWR, Recording System FINLAND 6 integrated TWRs, ACC, GSM-R Dispatcher Equipment for Finish Rail CHILE TWR, ACC SWEDEN TALK-Programme, 2 TWRs ARGENTINA ACC, Aeroparque Airport DENMARK 2 TWRs and APPs, 2 Military Communication Centres, Lyngby Radio ICELAND 2 TWRs, Maritime Communication System RUSSIA ACC, 2 Military Airports FAROE ISLANDS Maritime Rescue Centre UNITED KINGDOM OCEANIC Programme, 12 TWRs Voice Communication System for LACC (NERC), Electronic Flight Strips, 3 Military TWRs, POLAND 4 Airports, Warsaw ACC, Command & Control Centre for Fire Brigades UCMP-Programme, 9 UK Navy TWRs, Met Police, Firecontrol-Programme GERMANY 5 ACCs for DFS, ATIS and ARTE systems, 17 regional Airports, 12 regional TWRs, 22 KOFA Systems, DCRC, WSA Bremen, Command EUROCONTROL 2 CFMUs, Maastricht UAC, EAD, DIVOSand Control Centres Call Centre for CFMU, several Studies, FABEC N-VCS Project CZECH REPUBLIC Military ACC, 7 Military TWRs NETHERLANDS & ATIS Systems, Voice Recording-SLOVAKIA ACC, MFC Node, 4 Military TWRs BELGIUM SESAR ATC Support Information System, 2 Military Control AUSTRIA Voice Communication Systems for all Airports incl. TWR and Centres, AIS Integration, MRCC, Coast Guard APP Schwechat and ACC Vienna, Military Radio Network LUXEMBOURG TWR, Aerodrome Data Display & Electronic Flight Strips SLOVENIA ACC, 3 TWRs and Emergency System HUNGARY ACC, 2 Military Towers FRANCE Paris Airports (CDG, Le Bourget), 5 ACCs (ARTEMIS) CROATIA ACC 4 TWRs (Brest, Deauville, Outre-Mer), 6 Aerodromes, FABEC N-VCS Project MOLDAVA Approach, TWR SWITZERLAND ACCs in Genf and Zurich (VISTA), Command and BOSNIA HERZEGOVINA 2 TWRs, Approach, Voice Recording System Control Centre for Police, GSM-R for SBB SERBIA 3 TWR, ACC, Voice Recorder SPAIN Emergency Radio Access (Modules) for ACC, GREECE Olympic Games Command and Control Centre. MFC Terminals, 3 Maritime VCSs, Maritmie Network: GSM-R Pyrenees Maritime Communication System PORTUGAL 5 Systems ACC/APP/TWR, 5 Military TWRs TURKEY TWR MOROCCO TWR LEBANON ACC, APP, TWR KUWAIT ACC. TWR HINA 5 ACCs, 20 Airports, VTS Centre, Beijing CAAC Headquarters, EGYPT 8 TWRs, 6 Mobile Operation Centres, 2 Simulators Joint Operations Center River Information System BAHRAIN TWR KOREA APP, ACC, 2 TWRs QATAR Command & Control Centre for Asian Games, MCS for Port JAPAN Maritime Self-Defence Force GUINEA TWR TAIWAN 9 Airports, 4 Military TWRs, 2ACCs, JIOC SIERRA LEONE TWR HONGKONG Flight Strips NIGERIA 4 Airports, TAS INDIA 2 ACCs, GSM-R, 3 TWRs, Maritime Rescue Coordination Center CAMEROON TWR THAILAND 3 TWRs, 2 Military TWRs, ACC Bangkok UNITED ARAB EMIRATES ACC, APP, 3 TWRs, Airport PHILIPPINES 2 APPs, 3 TWRs, Emergency Network, Migration to EAD SAUDI ARABIA 9 TWRs, Military Air Defence Center VIETNAM ACC, Aproach YEMEN TWR MALAYSIA 6 TWRs, ACC, Air Defence Operation Centre SOUTH AFRICA Military HQ ZIMBABWE TWR SINGAPORE LORADS III ACC INDONESIA 17 TWRs, ACC, 2 Airports, Military Airport

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The problem

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ZABBIX is used in safety critical environments:

- \rightarrow Has an impact on person safety (ie. trains, airplanes, ...)
- System is "not allowed" to fail, this has to be mitigated by design & operation
- → You need to know the state of the system also for later analysis in case of an investigation
- System being capable to view not just red/green, but also minor/major faults and complex status





Typical failures:

- \rightarrow HW fails
- \rightarrow WAN links drops
- Power outages \rightarrow

Effects:

- Failure of monitoring makes system unusable \rightarrow
- \rightarrow You are "flying blind", you don't know whats effected
- Can lead to shutdown of complete system, as not in a known \rightarrow state anymore



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Monitoring gaps



- Gaps are in the monitored items \rightarrow
- \rightarrow What happend in there?
 - The fault itself? _
 - Consequence of fault _
 - Double fault possible
 - Monitoring failure





- The target is to have no gaps at all \rightarrow
- Doesn't have to be gap free immedeatily but at some point in time \rightarrow after a resync
- Allows a failure analysis "post-mortem" and to see what was the \rightarrow failure and what where consequences of the failure





- Need to avoid the SPOF (single point of failure) \rightarrow
- To solve that problem, the system gets duplicated \rightarrow
- One system is called the A system, the other one the B system \rightarrow
- In case of a failure in the A system, the system automatically \rightarrow switches over to the B system

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Part II – the "standard" way / Clustering



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- Monitoring system is seperate system \rightarrow
- Make the monitoring system redundant as well \rightarrow
- High bandwidth usage \rightarrow
- If system is remote, than a WAN link failure will drop whole site \rightarrow





- → Setup of two ZABBIX instances
- → Both are monitoring, if one fails, the other one still monitors
 But:
- \rightarrow Only allows passive checks (not sure with ZABBIX 2.0)
- \rightarrow You have to acknowledge it on two systems
- They can have different states (as checking on different timestamps)
- \rightarrow You always look on the wrong one \odot
- \rightarrow SO: DON'T DO THAT AT HOME! \odot





→ Using a full redundant SAN



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SAN based redundancy (II)

- \rightarrow No single point of failure, as common SAN storages are now internally fully redundant
- No sync and resync problems \rightarrow
- Can have almost have any amount of data \rightarrow
- But not geo-redundant \rightarrow



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→ Shared nothing architecture



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Shared nothing architecture (II)

- Allows operation in two different locations without any common piece of hardware (geo-redundant)
- \rightarrow No single point of failure
- \rightarrow Most complex setup
- → Recovery can be tricky (split brain, resync, ...)
- \rightarrow Size of database is limited due to sync speed
- \rightarrow Requires a lot, lot, lot of testing and tuning



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Part III - the "ZABBIX" way /

Distributed monitoring

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Center

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- \rightarrow Low bandwidth usage as data gets accumulated
- → WAN link failure will stop delivering data to central node, BUT it gets queued and stored
- \rightarrow As soon as link comes back, data goes into central data storage
- \rightarrow You have all of your data in one place
- Still each system has it's own monitoring system and you can connect to it or use the master node





ZABBIX has two ways of distributed monitoring:

- \rightarrow Node the heavyweight
 - "Networked" full ZABBIX systems which have a master node
- Proxy the lightweight \rightarrow
 - Only data collector to offload/distribute ZABBIX monitoring item queries



Node – The heavyweight solution

- → The node allows you to have a full ZABBIX server (including web interface) running on the remote site
- \rightarrow Setup is more complex
- \rightarrow Needs DB schema changes on all databases
- → Can do everything "on it's own"
- \rightarrow Has it's own fully fledged GUI



Proxy – The lightweight solution

- The proxy is only a small piece of SW running, can be co-located on servers
- \rightarrow Easy to install, needs no database, no local configuration
- → No node-setup in ZABBIX necessary
- \rightarrow Queues all the data

 \rightarrow But has no GUI







\rightarrow Any questions ?

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