

The Challenges and Solutions in 24/7 Energy Trading Applications

Power Trading

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Introduction to Energy IT Trading Products

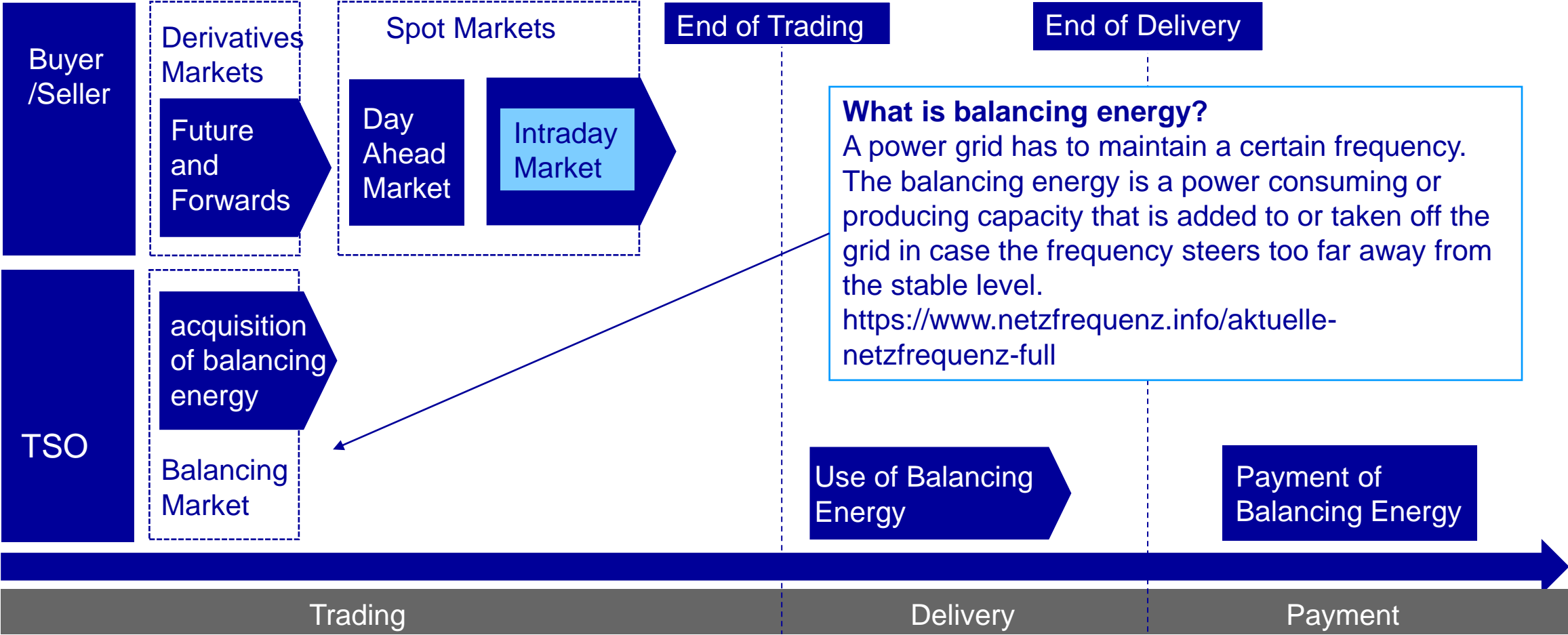
Intraday power trading

Power must be produced and used simultaneously. Electricity storage is still very expensive. Supply must meet demand exactly in the power grid otherwise there is an imbalance in the grid.

For that reason intraday power is traded 24/7



Overview of the Powermarket (timeline)



Intraday power trading

Intraday trading exists primarily to limit shortfalls or surpluses in the balancing group. This helps meet your forecast in demand or supply in the balancing group and therefore reduces potential imbalance costs.

Intraday trading is particularly useful for adjusting to unforeseen changes in power production and consumption by allowing the traders to buy or sell power until 5 minutes before delivery. The unforeseen change could come from an outage of a power plant, higher production of renewable energy as a result of a change in the weather forecast.

Contractual agreed Service Level Agreements

Availability:

The contractual agreed SLAs for availability allows us only to have a couple of hours downtime per year



24/7 Trading

The Challenges and Solutions

Challenges of developing 24/7 Applications

Software Quality

- Developing highly performant and highly available applications requires special approach to software development.

Maintenance and Updates

- Regular maintenance and system updates without interrupting the trading process.

Continuous System Monitoring and Real-Time data Analysis

- Ensuring application performance round-the-clock requires constant system monitoring. Handling real-time data, analyzing it, and making quick decisions.

Scalability

- The ability to scale up during peak trading hours without affecting performance.

Challenges of developing 24/7 Applications

Technical Glitches

- Identifying and fixing technical glitches in real-time to maintain seamless operations.

Redundancy and Backup

- Developing redundancy and backup systems to prevent complete shutdowns.

Integration with Other Systems

- Ensuring smooth integration with other systems and platforms.

User Support

- Providing 24/7 user support and resolving issues instantly.

Security and Compliance

- Protecting the application from cyber threats and ensuring data privacy 24/7 while .

Software Quality, Maintenance and Updates

Limited amount of downtime during the year, no “release/maintenance days”

Strong focus on software quality, stability and performance

Automation and quality gates

Testing esp. performance testing, long-running tests, fuzzy testing

Virtualization is essential for functional testing

Kafka as a data source including historical data

Multiple instances of components running in master-master mode

Releases and maintenances done via **seamless upgrades**



Automated Quality Control

More than **800**
automated
pipelines

- Pull requests
- Nightly builds
- “Definition of Done” checks
- Deployments
- Testing
- Security
- Compliance
- Dedicated module and utilities quality gates
- Cleanups
- Releases

Scalability, Technical Glitches, Redundancy, Integration with Other Systems

Virtualization is essential for fast growing markets

Configuration as a Code is fast to setup and enables us to recover fast to the functional state

Stretched Clusters

Stateless Microservices enables us to replace parts of systems fast

Automation – minimized human input

Self-Healing

Capacity Reports



Continuous System Monitoring and Real-Time data analysis

Observability services

Monitoring

Alerting

Elastic stack for logs analysis

CheckMK - Infrastructure & Application Monitoring

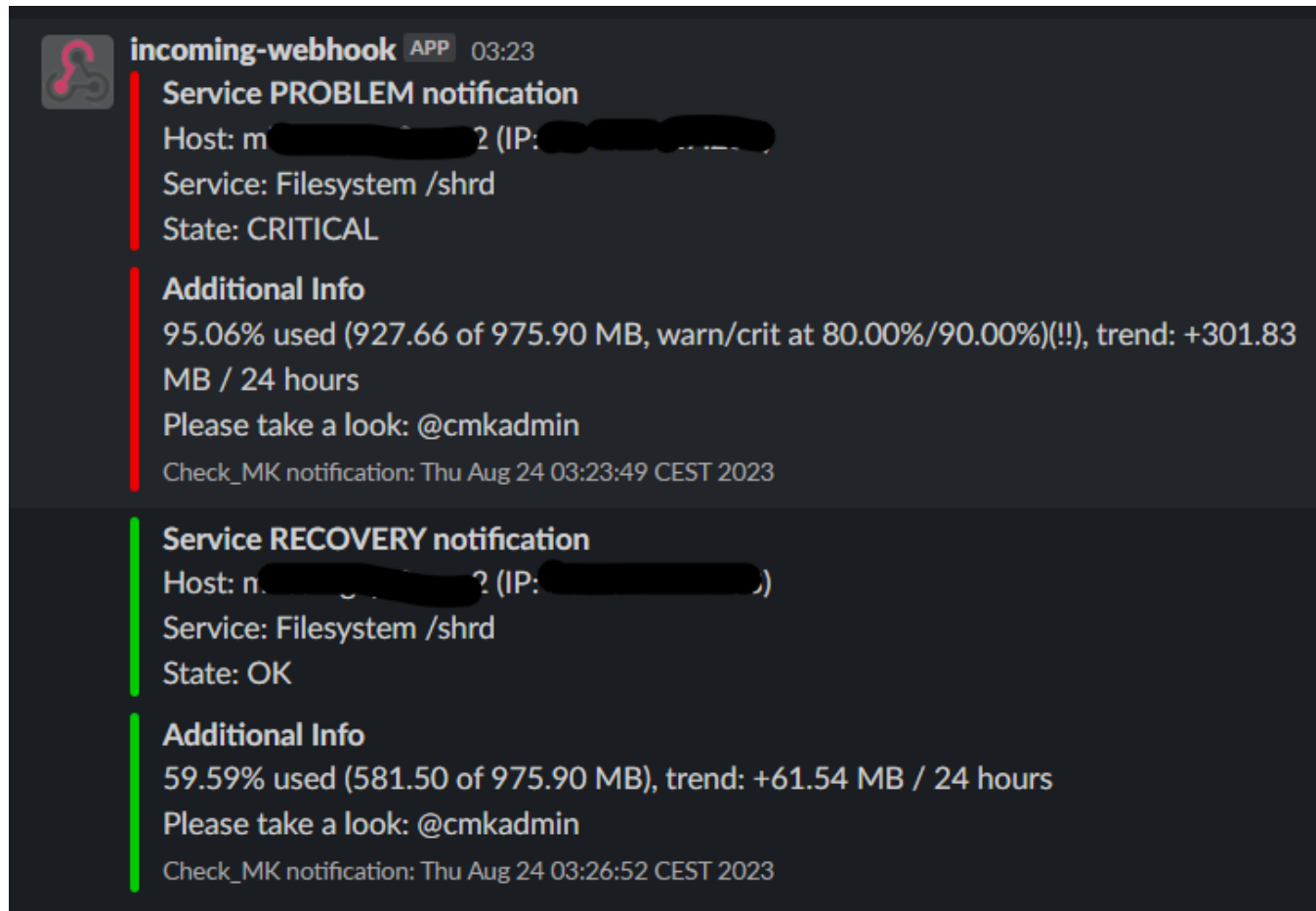
InfluxDB – Real time data analytics

Prometheus in the future

Network analysis (Packet Beat)



Self-healing example



The screenshot shows a Slack message from an application named 'incoming-webhook'. The message contains two notifications: a 'Service PROBLEM notification' and a 'Service RECOVERY notification'. The problem notification indicates that the 'Filesystem /shrd' service is in a 'CRITICAL' state due to high disk usage (95.06%). The recovery notification shows that the service is now in an 'OK' state with reduced disk usage (59.59%).

incoming-webhook APP 03:23

Service PROBLEM notification
Host: m [REDACTED] 2 (IP: [REDACTED])
Service: Filesystem /shrd
State: CRITICAL

Additional Info
95.06% used (927.66 of 975.90 MB, warn/crit at 80.00%/90.00%(!)), trend: +301.83 MB / 24 hours
Please take a look: @cmkadmin
Check_MK notification: Thu Aug 24 03:23:49 CEST 2023

Service RECOVERY notification
Host: n [REDACTED] 2 (IP: [REDACTED])
Service: Filesystem /shrd
State: OK

Additional Info
59.59% used (581.50 of 975.90 MB), trend: +61.54 MB / 24 hours
Please take a look: @cmkadmin
Check_MK notification: Thu Aug 24 03:26:52 CEST 2023

Monitoring Dashboard Example



Security and Compliance

Onboarding security and compliance for the new technologies is challenging

Dedicated Security and Compliance teams involvement

Automated scans of infrastructure, services and the code

Restricted access and strong access security measures

Dedicated network areas

Disaster Recovery Plans



User Support and People Involvement

People pro-activity during business hours

24/7 On-call support

Critical Business Processes

Cross team troubleshooting

Escalation processes

Keep eye on the industry and trends in the area



Thank you!

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#OpenDay2023

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