PUBLIC

OTC STATUS DASHBOARD
USER GUIDE

T-Systems International GmbH
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1   THE STATUS DASHBOARD (SD)

The Status Dashboard (SD) provides a status overview of Open Telekom Cloud (OTC) provided services. Is main purpose is to provide OTC customers with monitoring information measured from customers viewpoint. In order to achieve that, the SD system is located in a data center fully independent from the OTC platform. Thanks to this, the SD "sees" the OTC just like a customer do and access it through the Internet.

1.1   Structure of the dashboard

Figure 1: Structure of Status Dashboard of Open Telekom Cloud
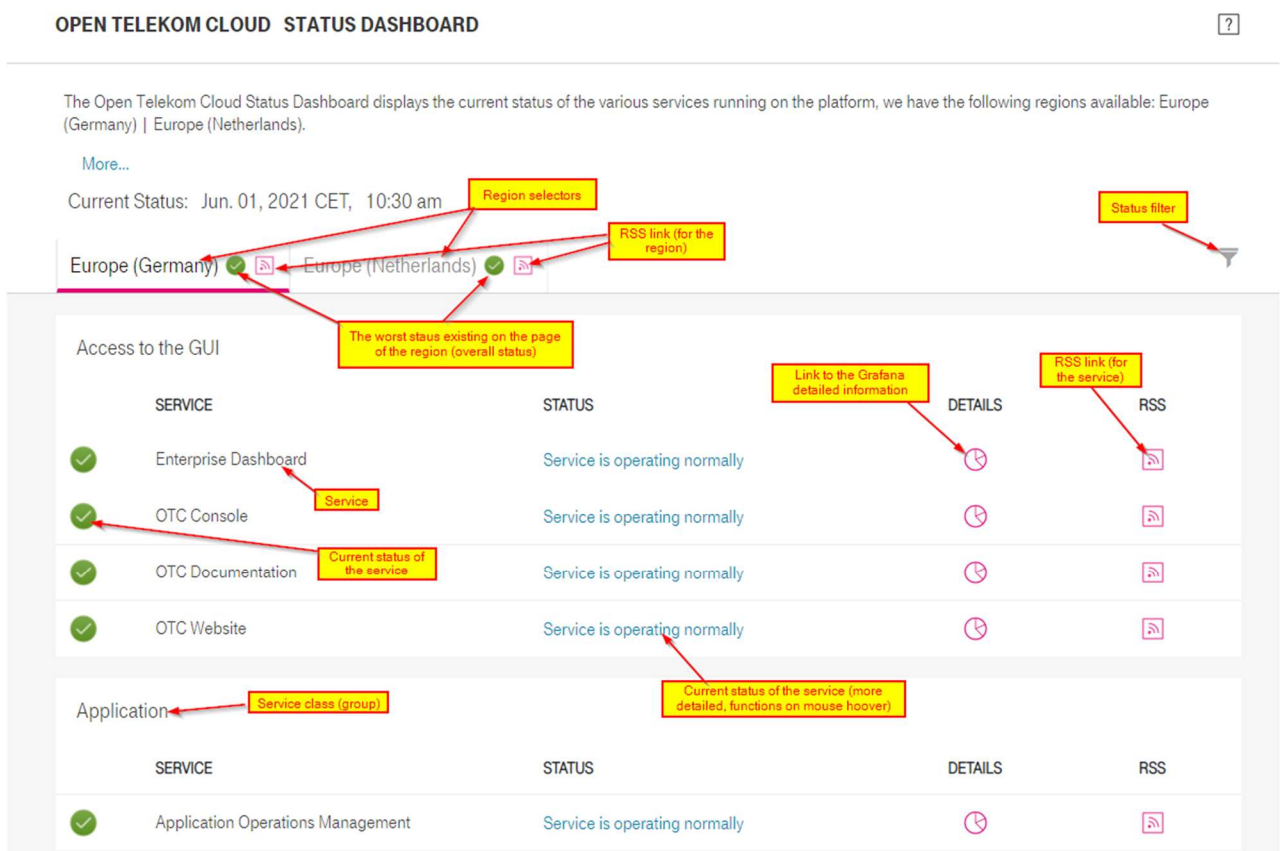
Messages displayed on the Status Dashboard

Our service team may post messages on the SD. Once the OTC operation team work 24/7, messages may appear at any time, immediately informing customers about events on the OTC. Events could be

- general information
- security relevant information (e.g. about vulnerabilities) or
- updates and remediation plans about incidents
-

Messages can be posted for the whole Open Telekom Cloud globally or for a specific region only:

Figure 2: Global or region-specific messages

Messages about upcoming and ongoing maintenances can be displayed on the main dashboard (please verify figure 3 "Maintenance information"). Errors detected during an ongoing maintenance are treated differently by the SD. Customer messages and maintenance messages both appear in RSS feeds. See their explanation in the paragraph "The RSS feeds".

Figure 3: Maintenance information

1.2   States of a service

Services and functions may be in different states. They may have some issues (slowdown, instability, failure, etc.) or may be fully down. The dashboard fetches all the data in a configurable interval. This parameter is usually set to 10min. The actual state is calculated based on results collected during that period. Experience showed, that setting this time frame less than 10min would lead to unnecessary "flapping" of states in case of an intermittent, short living issues. Also, this period means that the dashboard will display the detected error situation after 10min in the worst case. On the other hand, it will take ˜>10min for the dashboard to display normal situation after the error has gone.

Most likely visitor will see three different status icons which show the state of the service, except the ones indicate a planned maintenance:

General status icons:

 The service operates normally

 The service is having some issues (e.g. requests take longer than 3 seconds)

The service is highly unstable or completely down (wrong answer or request takes longer than 10 seconds)

Maintenance status icons:

Maintenance is planned for the service

Maintenance is ongoing for the service

The tables below show all possible color codes and their associated statuses:

Services

Functions (weight)	Color	Message
All good (1)	🟩	All functions are up and running
Less than half of the functions are slow (2)	🟩	Some functions may respond slowly
Greater or equal than half of the functions are slow (2)	🟨	Most of the functions may respond slowly
Less than half of the functions are slowed down (3)	🟨	Some functions are overloaded
Greater than or equal to half of the functions are slowed down (3)	🟧	All functions are slowed down
Less than half of the functions are unstable (4)	🟧	Some functions are unstable
Less than or equal half of the functions are unstable (4)	🟥	Most of functions are unstable
1 or less than half of functions down (5)	🟥	Some functions are down
Greater than or equal to half of the functions down (5)	🟥	Service is down

Table 1: Possible color codes and their associated statuses

The same for functions of a certain service:

Last 10	Color	Message
All good	🟩	All responses are up and running
3 slow	🟨	Function may respond slowly
Last 3 slow	🟧	Function is slowed down
3 response time is zero	🟧	Instability
Last 3 response time is zero	🟥	Function is down

Table 2: Color codes of functions

1.3   Main functions of the Status Dashboard

- Selecting a certain region will show all services monitored in that region

- Clicking on the global RSS link (📶) will download the RSS source (XML). If your browser is equipped with an RSS reader, it will most likely offer to subscribe to that feed (depends on the RSS reader installed)

- Hoovering the cursor over the "Status" message of the service will lead to a small pop-up window with statuses of all monitored functions of the service
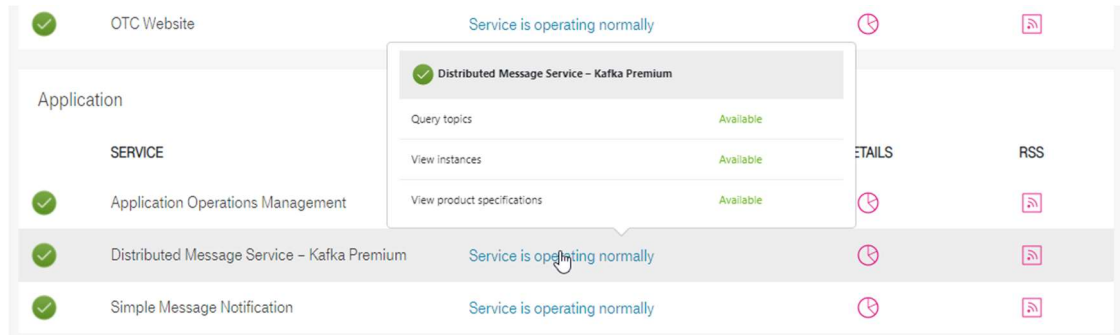
Figure 4: Message when hoovering the cursor over the "Status" message

- Clicking on the "Details" link (🕓) will open a new browser tab with detailed information about the service on a Grafana page

- Clicking on the RSS link (📶) of the service will download the RSS source (XML) for that single service

The status filters

In case of an issue detected for a region, the global status icon will show the worst state that exists in the region. Also, if a planned maintenance is defined in the SD system, the global status icon will show the upcoming (🟢) or ongoing (🔧) maintenance. In such cases it can be annoying to scroll through the page to find the service affected. For more convenient listing of services in particular states the status filter has been implemented:
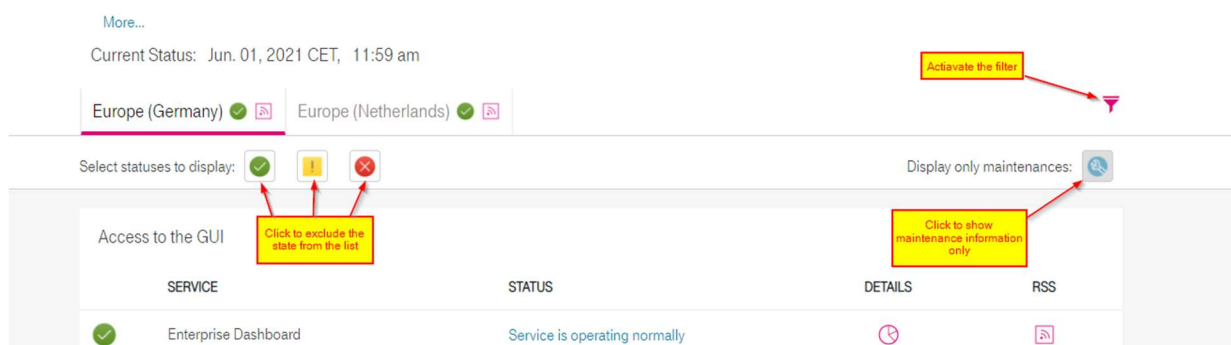

Figure 5: Using the status filter

1.4   The RSS feeds

The SD provides RSS feeds to inform customers about status changes in our services. There are two types of RSS feeds:

1. Global RSS feed:
   Will contain messages about any service in the region that changes its state (having issue, going down, coming up again).

2. Service specific RSS feed:
   Will contain messages only for the particular service for which it was created.

Items (messages) in the feed are sorted by the time of the detection of the state change. The newest message will be always the first (descending order).

You may subscribe to those RSS feeds using any decent RSS reader. Although the SD does not provide push notification functions, using the RSS feed with a short enough refresh period may give almost the same functionality as push notification would do.

The RSS feed may contain the following information:

- state change of a service: getting into the error state and the recovery
- reminder about messages published for customers on the dashboard
- reminder about planned maintenance periods for certain services (Several state changes of those: published, planned, ongoing, deleted, etc.)

Any message will be kept only for 24 hours in the feed.

2   GRAFANA PAGES FOR DETAILED ANALYSIS

For showing detailed measurement information about OTC services, a Grafana server hosting several dashboards is implemented in the SD system.

Warning: Please do not select long time periods (more than 30 days) on Grafana dashboards if there is not a good reason for that! Long periods may cause lang loading time and end up in ta time-out.

2.1   Service details

Details about a particular service are displayed on a special Grafana page. It can be accessed by clicking on the "Details" icon (⊕) on the main dashboard.
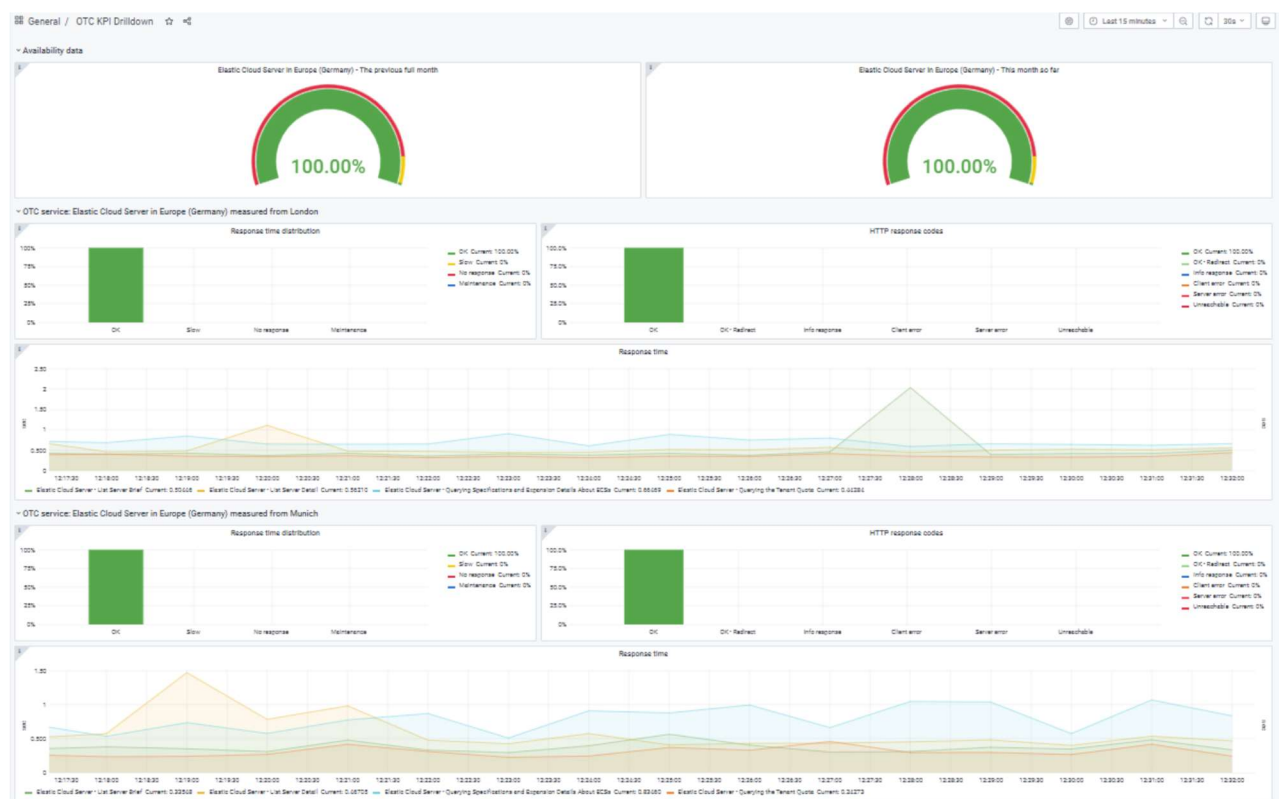
Figure 6: Detailed view of a service

On this dashboard some availability data (for the previous month and for the current month so far) is displayed for any service selected from the main dashboard. Below that, the detailed measurement data is displayed for all data collectors sending test requests to the particular service (in our case, data collectors in London and Munich).

In the upper left corner of graphs an information link is available. Hoovering the cursor above the information area the information appears in a pop-up.Some of those are containing links that can be followed.

2.2   Showing maintenance periods on the service details page

Maintenance messages entered into the system are kept in an archive for the same time period as measured data is kept in the Prometheus DB. As a result, maintenance periods are marked on the "Response time" graph for the whole period the data is represented in the DB (currently 220 days).
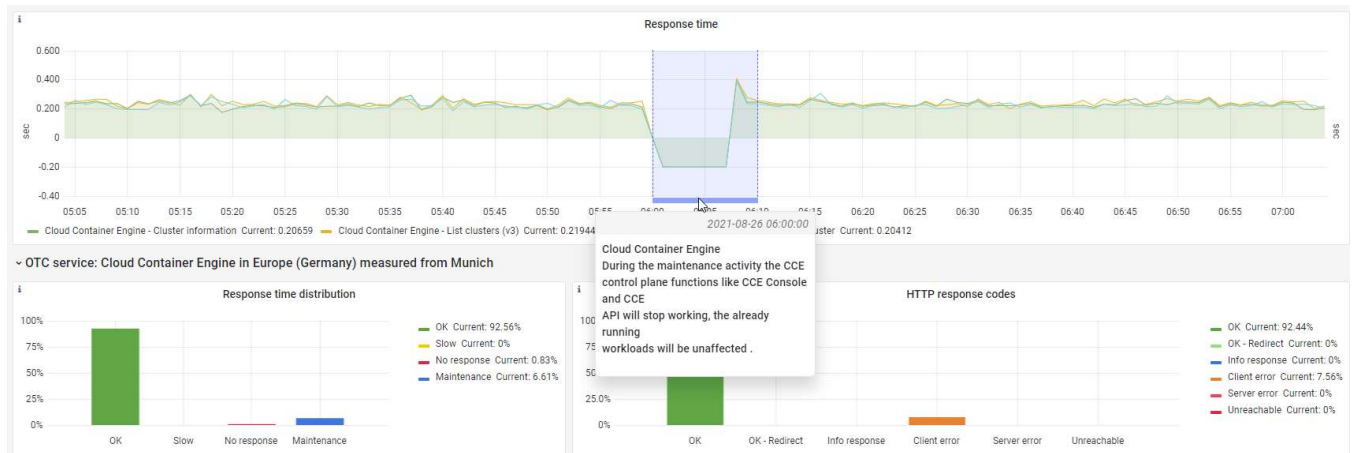
Figure 7: Showing maintenance periods on the service details page

2.3   The SLA relevant availability

The availability is calculated for all services. The SLA[1] contains three core services and guarantees certain availability for those.
Availability for those services is also calculated. Monthly graphs for the last half year are collected in a separate Grafana page accessible from the information area of the last month availability graph of any service:

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[1] Only in case an Enterprise Agreement 1.0 (EA1.0) or Enterprise Support Agreement 2.0 (ESA2.0) are contractually ordered. More details available here.
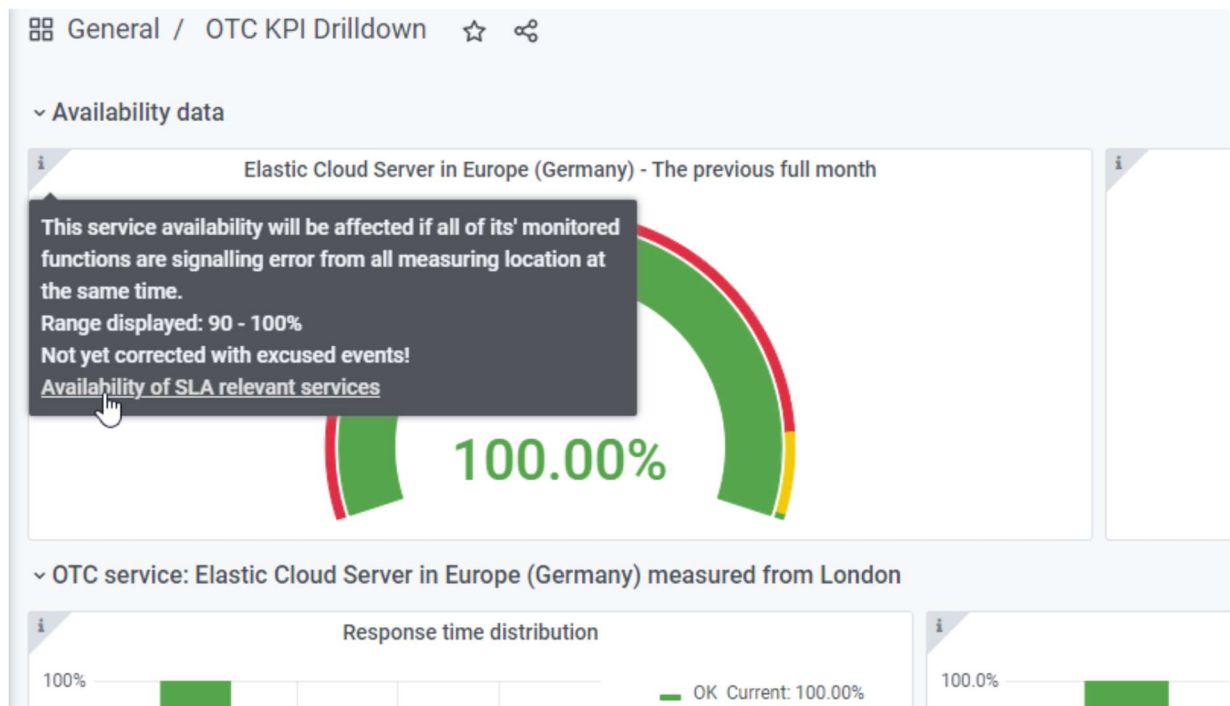
Figure 8: Availability of SLA relevant services

In contrast to the SLA itself, the Grafana page shows availability for four services. The fourth one is the Elastic IP service. It is included into this Grafana page, because SD checks EIP availability by sending HTTP requests to virtual machines (ECS) deployed in different availability zones through their associated public IP addresses. That way this check provides information not only about the status of the EIP service, but also about health of existing virtual machines created by the ECS service.
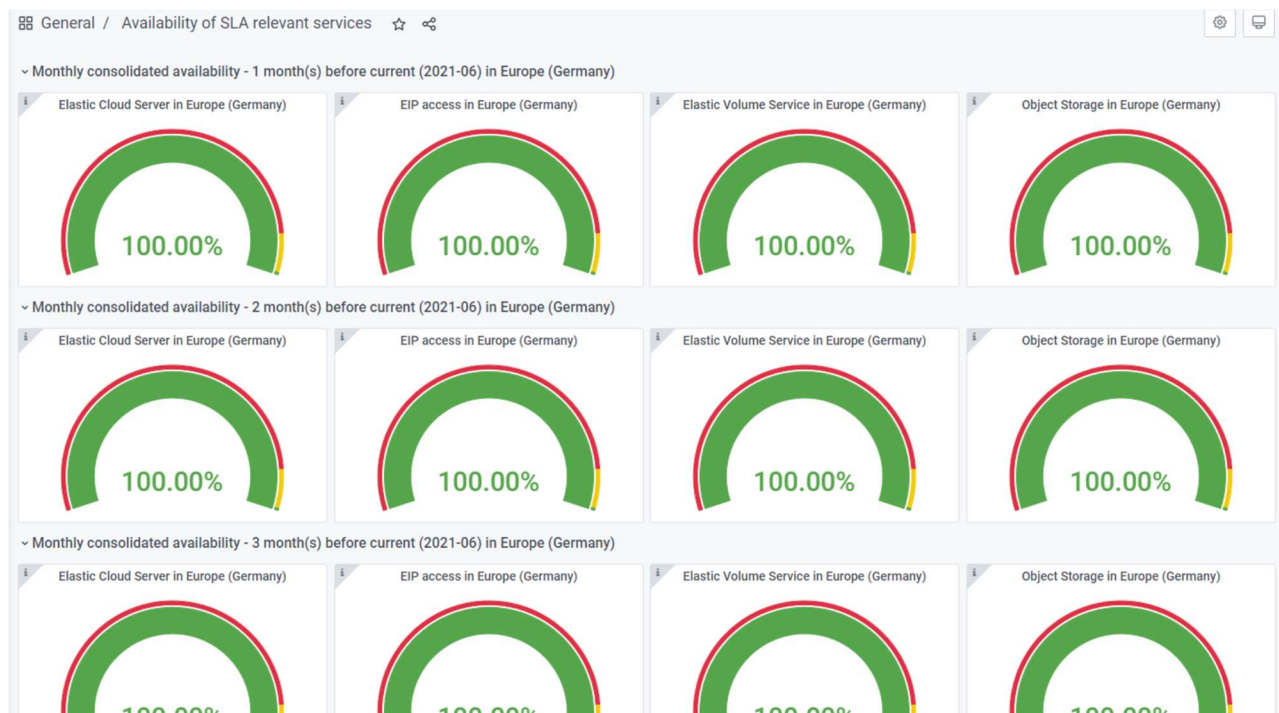
Figure 9: Overview of SLA measuring[2]

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[2] EIP is not part of the SLA within Enterprise Agreement 1.0 (EA1.0) or Enterprise Support Agreement 2.0 (ESA2.0)

2.4 "All-in-one" dashboard

Clicking on the name of the Grafana dashboard ("OTC KPI Drilldown") will take the user to the list of available dashboards. There are two of them that can be used separately: "OTC KPI" and "OTC Problematic services". Others require parameters passed to them when calling from the main dashboard, or from another Grafana dashboard.

The "all-in-one" dashboard is the one called "OTC KPI". It displays graphs for all monitored services for any selected region and time frame:
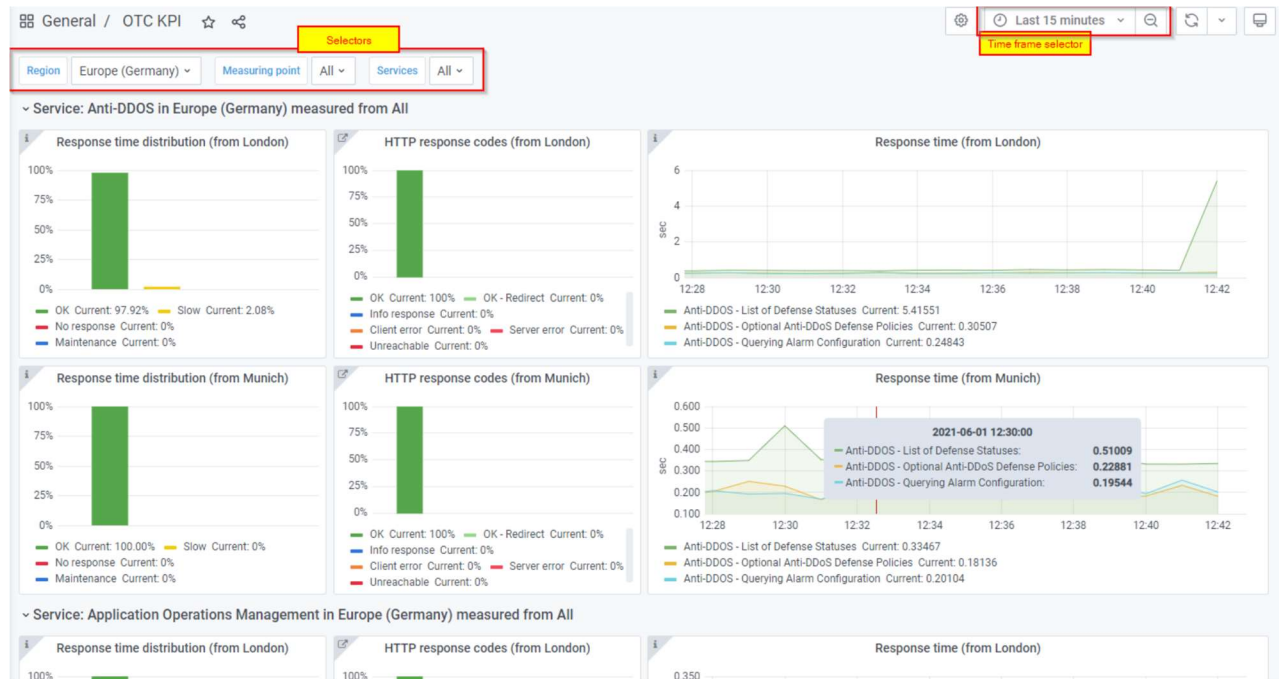
Figure 10: "All-in-one" dashboard

IT professionals may need to see all, or selected services on a single page. Once all graphs on the page are synchronized with each-other and displaying the same period, some correlations between those graphs may give important hints about deeper analysis of the state of the system.

Although it is technically possible to request information on this page about all services in a region for the whole time period of the data retention defined in the system, is still not a good idea to do that. It won't provide much useful information but will put a huge load on the SD system.
Services showing some abnormal measured valuesIf an issue appear on the OTC, then - depending on the failing system element - several services may be affected. To easily see measurement data for those services on a single page, the dashboard described above has been duplicated and a special filter has been added to it.
As a result, the "OTC Problematic services" dashboard collects all services having any issue during the selected time frame in the Grafana page.

It is important to understand, that on this dashboard all services providing one slow response or error at least from one measuring location will be displayed. It doesn't necessarily mean that those services are really having an issue. It may happen that only one data collector shows an increased response time or error which is not correlating with results from the other one. In such a case the OTC service is working well, but a data collector may be affected by some network latency or alike. One should always pay attention to the correlation of graphs on different data collectors for understanding the status of the OTC service monitored.

3 TECHNICAL OVERVIEW

The SD is a simplified monitoring system, capable to show if a service provided by the Open Telekom Cloud is alive, having issues or is down. The user can see the current status and historical data for longer than six months. The SD is a high-level monitoring system providing information about general availability of services offered by the OTC. The platform is also monitored using other, more detailed, professional grade monitoring systems used by the OTC Operation team. Those monitoring systems are not available publicly. Each customer should acknowledge that monitoring of their own resources used in their own tenants is a responsibility of the given customer[3]. The OTC provides tools for that (one may set up monitoring of owned resources using services offered by the OTC, like Cloud Eye, Log Tank Service, Cloud Trace Service).

The system is sending queries like API requests to three or more functions of a service. The SD decides about the state of the service by measuring the response time and checking the HTTP response code in replies to API requests.

In a general case, functions of the service itself are tested. In some cases, test requests are sent to real entities created for the testing. Example of that is the Elastic IP (EIP) test, which sends requests to basic HTTP servers on real virtual machines created in different availability zones.

The SD provides information about:
- availability of OTC services for all regions and their Availability Zones
- maintenances
- messages from the service team towards customer in case of service interruption
- historical monitoring data
- RSS feeds for information about state changes of services
- availability of SLA relevant services
- filtering states and maintenances shown on the dashboard
- overview of potentially problematic services

3.1 Main system components

SD consists of four main components:
- The data collector
- Data handling
- The main dashboard
- The Grafana

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[3] Please also check chapter 5 of the service description: The customer´s duties to cooperate

3.1.1   The data collector

The data collector is sending out API requests and checks replies to those. Results are exposed using HTTP serving for consuming those by the central database of the Status Dashboard..

The data collector uses two simple facts for showing error conditions:

1. The response time for an API request cannot ever equal to zero.
    Based on this it is possible to use the zero value for showing the error state. If an error or request time-out (10 sec) happens, the data collector forcibly sets the response time to zero. The zero value is used for showing the error in the system and plays essential role in displaying state and availability calculation.

2. The response time for an API request cannot ever equal to any negative value.
    In the SD it is possible to define a period of time for services during which period a planned maintenance is conducted. Those maintenances are communicated to customers. Some of them may cause temporary outages in the service maintained. If the data collector detects an error during such time frame, it will set the response time to a small negative value (currently -0.2 sec). Using this trick, the maintenance can be clearly displayed on graphs and it can be excluded from availability calculations.

The SD system can use as many data collectors as needed.

3.1.2   "Translated" services

The data collector of the Status Dashboard understands only HTTP requests and replies sent to those by monitored services. On the other hand, there can be services not accepting HTTP requests but still to be monitored. For that purpose the protocol translator is used. That is a piece of software receiving HTTP requests from the data collector and forwarding those using the protocol used by the monitored service.
Monitored service understanding protocol other than the HTTP sends back the status information (OK, Redirect, Client error, Server error and possibly others) in a way specific to the protocol used by that. But the PSD examines and displays only HTTP response codes. For bridging this gap a mapping of real response codes gathered from the monitored service to HTTP response codes is carried out. Although, mapped HTTP response codes will not perfectly reflect the real status of the monitored non-HTTP service, the proper mapping will still give a good hint about the real state of the monitored service.

3.1.3 Current response mappings used on the PSD

3.1.3.1 DNS

DNS Return Message	DNS Response Code	Function	HTTP code
NOERROR	RCODE:0	DNS Query completed successfully	200
FORMERR	RCODE:1	DNS Query Format Error	400
SERVFAIL	RCODE:2	Server failed to complete the DNS request	500
NXDOMAIN	RCODE:3	Domain name does not exist.	500
NOTIMP	RCODE:4	Function not implemented	500
REFUSED	RCODE:5	The server refused to answer for the query	500
YXDOMAIN	RCODE:6	Name that should not exist, does exist	500
XRRSET	RCODE:7	RRset that should not exist, does exist	500
NOTAUTH	RCODE:8	Server not authoritative for the zone	300
NOTZONE	RCODE:9	Name not in zone	500

Table 3: DNS response mapping

3.1.4 Data handling

The SD uses a time series database system for collecting, storing and providing data for dashboards. The DB used in the SD is a Prometheus time series DB.

The Prometheus is capable to fetch data from its data sources. It sends HTTP requests to data collectors in 60 sec period for fetching data measured by them.

The data retention time in the Prometheus DB is a bit more than 200 days. Thanks to this we may provide consolidated availability data for our services for the last half year.

3.1.5 The main dashboard

The main dashboard is the first thing a visitor sees when accessing the SD. This is also a proprietary software written by the same team as the data collector. It shows the overall status of OTC regions and statuses of all services monitored in those regions.

3.1.6 The Grafana

For displaying detailed measurement data for services, a Grafana server is used. Several dashboards are defined in the Grafana system for providing detailed information about our services for any period during the data retention time set up for the Prometheus DB.

3.2 Redundancy in the data collection

For easy integration with external systems the status dashboard provides some publicly available API functions. Those are providing information about overall status of regions and also about maintenance periods announced for certin services.

All APIs return information in the HTML body of their replies. The format of the data returned is JSON.

3.2.1 The overall status

The API is accessible at the "/api/generalstatus/" URL. The data returned contains the actual global status of all regions monitored by the given instance of the status dashboard:

```
[{
    "targetName": " Global Services",
    "statusDate": "2022-01-03T11:31:28+01:00",
    "status": 1,
    "isMaintenancePlanned": false,
    "isMaintenanceOngoing": false
}, {
    "targetName": "Europe (Germany)",
    "statusDate": "2022-01-03T11:31:28+01:00",
    "status": 1,
    "isMaintenancePlanned": false,
    "isMaintenanceOngoing": false
}, {
    "targetName": "Europe (Netherlands)",
    "statusDate": "2022-01-03T11:31:28+01:00",
    "status": 1,
    "isMaintenancePlanned": false,
    "isMaintenanceOngoing": false
}
]
```

Value mapping for statuses:

Status value	Status explained
1	All services are available
2	There is at least one service having minor issues (slow)
3	There is at least one service having major issues (unstable, unavailable)

Table 4: Value mapping for statuses

3.2.2   Actual maintenance messages

The API is accessible at the "/api/maintenance/all/" URL. It will return information about all maintenance messages currently displayed on the message editor. All messages are returned regardless if they are planned, ongoing or past maintenances. Note, that for avoiding having too much messages on the editor page, maintenance messages can be deleted. However, messages are still kept in the message archive except deletion from there was explicitly selected during deletion from the editor. Example output returned by the API:

```
{
    "Europe (Germany)": {
        "Access to the GUI": {
            "Enterprise Dashboard": {
                "85bd29ab-e8e9-4f81-80b3-d2bd07f4375f": {
                    "Id": "85bd29ab-e8e9-4f81-80b3-d2bd07f4375f",
                    "MeasuringTarget": "Europe (Germany)",
                    "ServiceClass": "Access to the GUI",
                    "Service": "Enterprise Dashboard",
                    "From": "2021-07-02T22:00:00Z",
                    "To": "2021-07-04T22:00:00Z",
                    "NotifyTime": 100,
                    "Message": "\u003cp\u003e\u003cspan style=\"font-family: TeleGroteskNext; font-size: 18px;\"\u003e\u003c/span\u003e\u003cspan style=\"font-weight: bolder;\"\u003eCustomer Impact:\u003c/span\u003e\u0026nbsp;Billing data will not be updated during the weekend.\u003cbr\u003e\u003c/p\u003e\u003cp\u003eBilling data till 02.07.2021 can be accessed via UI and API. Regular loads will resume on Monday.\u003c/p\u003e\u003cp\u003e\u003cspan style=\"font-family: TeleGroteskNext;\"\u003e\u003c/span\u003eIn case of issues afterwards, please contact our\u0026nbsp;\u003ca href=\"https://docs.otc.t-systems.com/en-us/public/learnmore.html\" target=\"_blank\" style=\"background-color: rgb(246, 246, 246);\"\u003eOpen Telekom Cloud Service Desk\u003c/a\u003e.\u003c/p\u003e"
                }
            }
        },
        "Computing": {
            "Cloud Container Engine": {
                "1289aec6-bae4-49a4-b0db-257e93167cb6": {
                    "Id": "1289aec6-bae4-49a4-b0db-257e93167cb6",
                    "MeasuringTarget": "Europe (Germany)",
                    "ServiceClass": "Computing",
                    "Service": "Cloud Container Engine",
                    "From": "2021-08-26T04:00:00Z",
                    "To": "2021-08-26T04:10:00Z",
                    "NotifyTime": 24,
                    "Message": "\u003cp class=\"MsoNormal\"\u003eDuring the maintenance activity the CCE control plane functions like CCE Console and CCE\nAPI will stop working, the already running\nworkloads will be unaffected .\u003co:p\u003e\u003c/o:p\u003e\u003c/p\u003e"
                },

.

.
```

.

3.2.3   All maintenance messages currently in the archive

The API is accessible at the "/api/maintenance/grafana/".

As it was stated before, all maintenance messages are kept in the message archive until they are deleted explicitly from using the delete function in the message editor or aged out regarding the configuration parameter ("maintenanceArchive/deleteAfter"; see later). Purpose of that archive is the ability to show historical data on Grafana pages during the whole data retention period. The data returned by this API is used primarily by the Grafana server for annotating maintenance periods on Grafana dashboards. But the API is available also publicly for integration purposes. Example output looks like this:

```
{
    " Global Services": {
        "Global Services": {
            "OTC Console": {
                "da33737d-8724-44e0-9136-6f18f8401017": {
                    "Id": "da33737d-8724-44e0-9136-6f18f8401017",
                    "MeasuringTarget": " Global Services",
                    "ServiceClass": "Global Services",
                    "Service": "OTC Console",
                    "From": "2021-10-27T15:30:00Z",
                    "To": "2021-10-27T18:30:00Z",
                    "NotifyTime": 24,
                    "Message": "\u003cp class=\"MsoNormal\" style=\"font-family:
TeleGroteskNext;\"\u003eDue to planned maintenance activity on the Key Management Service
(KMS) a short interruption of the service might occur during the
downtime.\u003cbr\u003e\u003c/p\u003e\u003cp class=\"MsoNormal\" style=\"font-family:
TeleGroteskNext;\"\u003e\u003co:p\u003e\u003c/o:p\u003e\u003c/p\u003e\u003cp
style=\"font-family: TeleGroteskNext;\"\u003e\u003c/p\u003e\u003cp class=\"MsoNormal\"
style=\"font-family: TeleGroteskNext;\"\u003eIn case of issues afterwards, please contact
our\u0026nbsp;\u003ca href=\"https://docs.otc.t-systems.com/en-us/public/learnmore.html\"
target=\"_blank\"\u003eOpen Telekom Cloud Service Desk\u003c/a\u003e.\u003c/p\u003e"
                }
            }
        }
    },
    "Europe (Germany)": {
        "Access to the GUI": {
            "Enterprise Dashboard": {
                "85bd29ab-e8e9-4f81-80b3-d2bd07f4375f": {
                    "Id": "85bd29ab-e8e9-4f81-80b3-d2bd07f4375f",
                    "MeasuringTarget": "Europe (Germany)",
                    "ServiceClass": "Access to the GUI",
                    "Service": "Enterprise Dashboard",
                    "From": "2021-07-02T22:00:00Z",
                    "To": "2021-07-04T22:00:00Z",
                    "NotifyTime": 100,
                    "Message": "\u003cp\u003e\u003cspan style=\"font-family: TeleGroteskNext; font-
size: 18px;\"\u003e\u003c/span\u003e\u003cspan style=\"font-weight:
bolder;\"\u003eCustomer Impact:\u003c/span\u003e\u0026nbsp;Billing data will not be
updated during the weekend.\u003cbr\u003e\u003c/p\u003e\u003cp\u003eBilling data till
02.07.2021 can be accessed via UI and API. Regular loads will resume on
```

Monday.\u003c/p\u003e\u003cp\u003e\u003cspan style=\"font-family:
TeleGroteskNext;\"\u003e\u003c/span\u003eIn case of issues afterwards, please contact
our\u0026nbsp;\u003ca href=\"https://docs.otc.t-systems.com/en-us/public/learnmore.html\"
target=\"_blank\" style=\"background-color: rgb(246, 246, 246);\"\u003eOpen Telekom Cloud
Service Desk\u003c/a\u003e.\u003c/p\u003e"
                }
            }
        },
        "Computing": {
            "Cloud Container Engine": {
                "1289aec6-bae4-49a4-b0db-257e93167cb6": {
                    "Id": "1289aec6-bae4-49a4-b0db-257e93167cb6",
                    "MeasuringTarget": "Europe (Germany)",
                    "ServiceClass": "Computing",
                    "Service": "Cloud Container Engine",
                    "From": "2021-08-26T04:00:00Z",
                    "To": "2021-08-26T04:10:00Z",
                    "NotifyTime": 24,
                    "Message": "\u003cp class=\"MsoNormal\"\u003eDuring the maintenance activity
the CCE control plane functions like CCE Console and CCE\nAPI will stop working, the already
running\nworkloads will be unaffected .\u003co:p\u003e\u003c/o:p\u003e\u003c/p\u003e"
                },

.

.

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3.3   Redundancy in the data collection

The SD can consume data from arbitrary number of data collectors. Using this feature, we installed two data collectors for each OTC regions. This way measurements are done for both regions (Germany and Netherlands) from Munich and from London. This redundancy makes
it possible to ignore errors of a single data collector or the network path from a certain data collector to the OTC. The main dashboard will always display the best data available from all collectors. This way issues outside of the OTC are masked (they still can be seen on Grafana dashboards).

4   LIST OF ABBREVIATIONS/GLOSSARY

Term	Description
API	Application Programming Interface – typically used for automatic control and/or integration into higher-level orchestration
AZs	Availability Zones
DB	Database
ECS	Elastic Cloud Computing
EIP	Elastic IP
EVS	Elastic Volume Service
HTTP	Hypertext Transfer Protocol
KPI	Key Performance Indicator
OBS	Object Storage Service
OTC	Open Telekom Cloud
RSS	Really Simple Syndication
SD	Status Dashboard
SLA	Service Level Agreement
XML	Extensible Markup Language