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Monitoring the Health of Computer Networks with Visualization

VAST 2012 Mini Challenge 1 Award: “Efficient Use of Visualization”

Alexander Kachkaev, Iain Dillingham, Roger Beecham, Sarah Goodwin, Nabiha Ahmed, Aidan Slingsby – giCentre, City University London

Facility grid

Displays the entire network on a single screen

Each facility is represented by a row of pixels showing aggregated values of parameters. Regions can be arranged alphabetically or geographically. Facilities within regions can be sorted by name, timezone, longitude, latitude, IP addresses or by values of any parameter at any time. Statistics can be shown only for a subset of machines (filtering is done by machine function and class). The grid can be panned and zoomed. The app supports 3 views:

Snapshot view

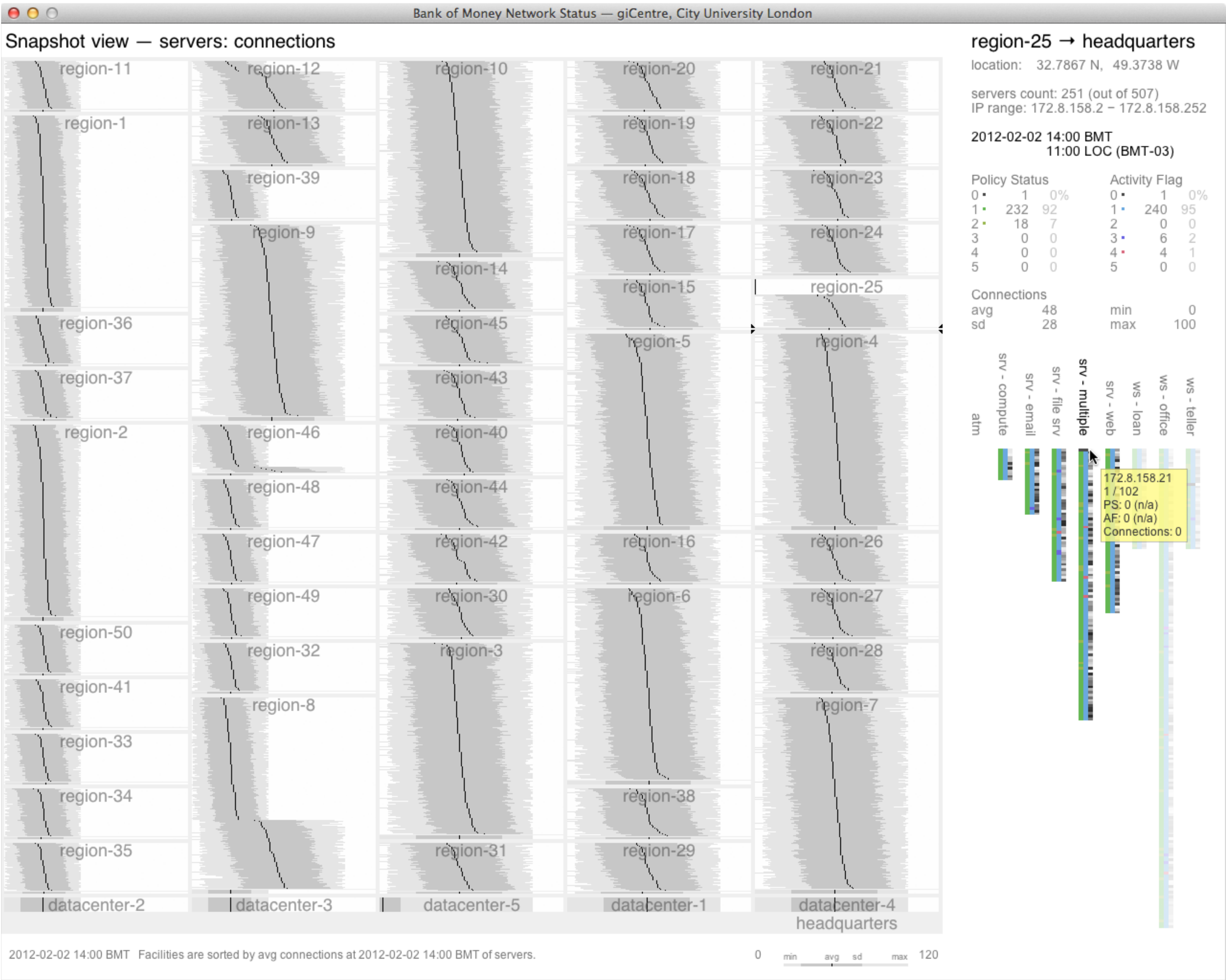
Shows statistical variables for numbers of connections or distribution of policy status (PS) or activity flag (AF) at particular time

Temporal view

Shows the change of a single parameter over time

Overall view

Shows network status change over time (aggregation by regions, not facilities)



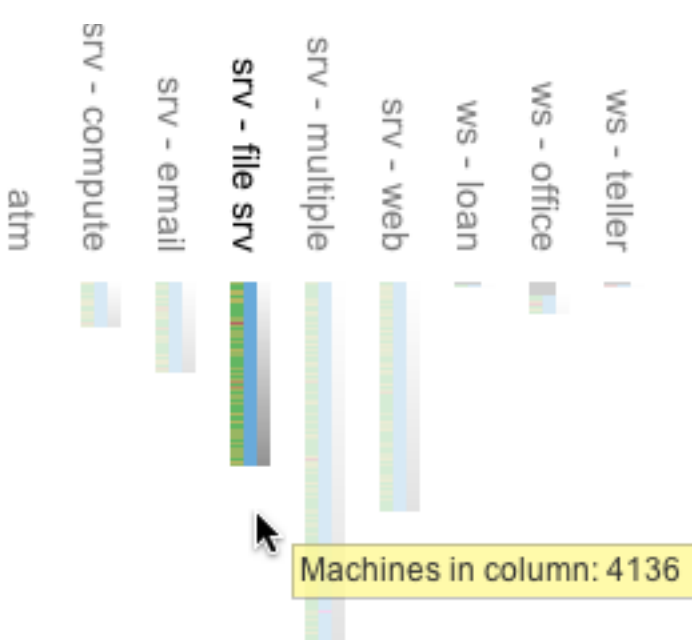
Facility details

Displays summary statistics for a facility selected in the grid on the left

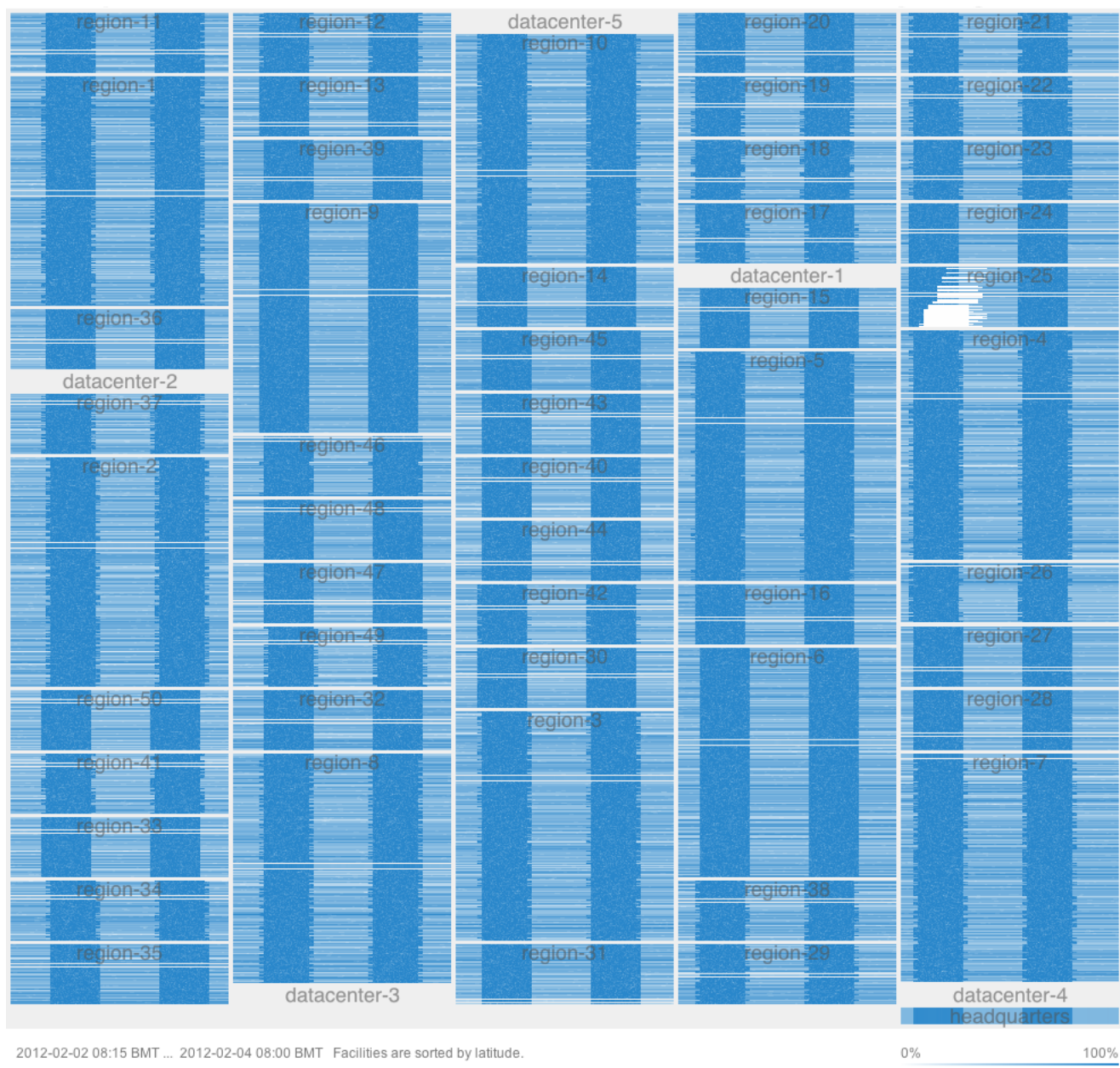
Machine details

Shows PS, AF, connections for each machine in a selected facility

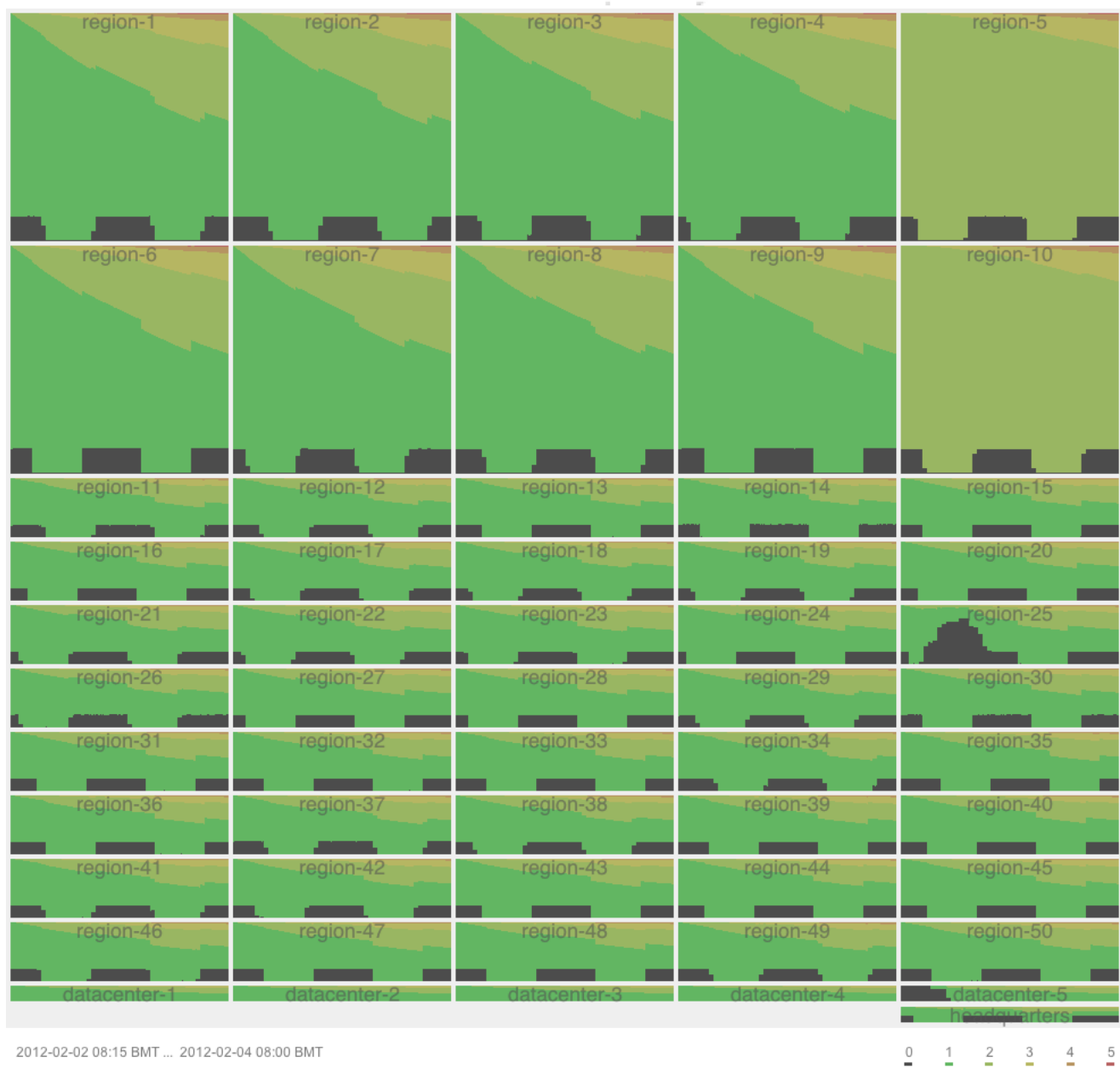
Machines in columns can be sorted by policy status, activity flag, connections and IP address. Vertical panning and zooming helps browsing machines in data centers and headquarters:



Temporal view – workstations/loan: AF=1



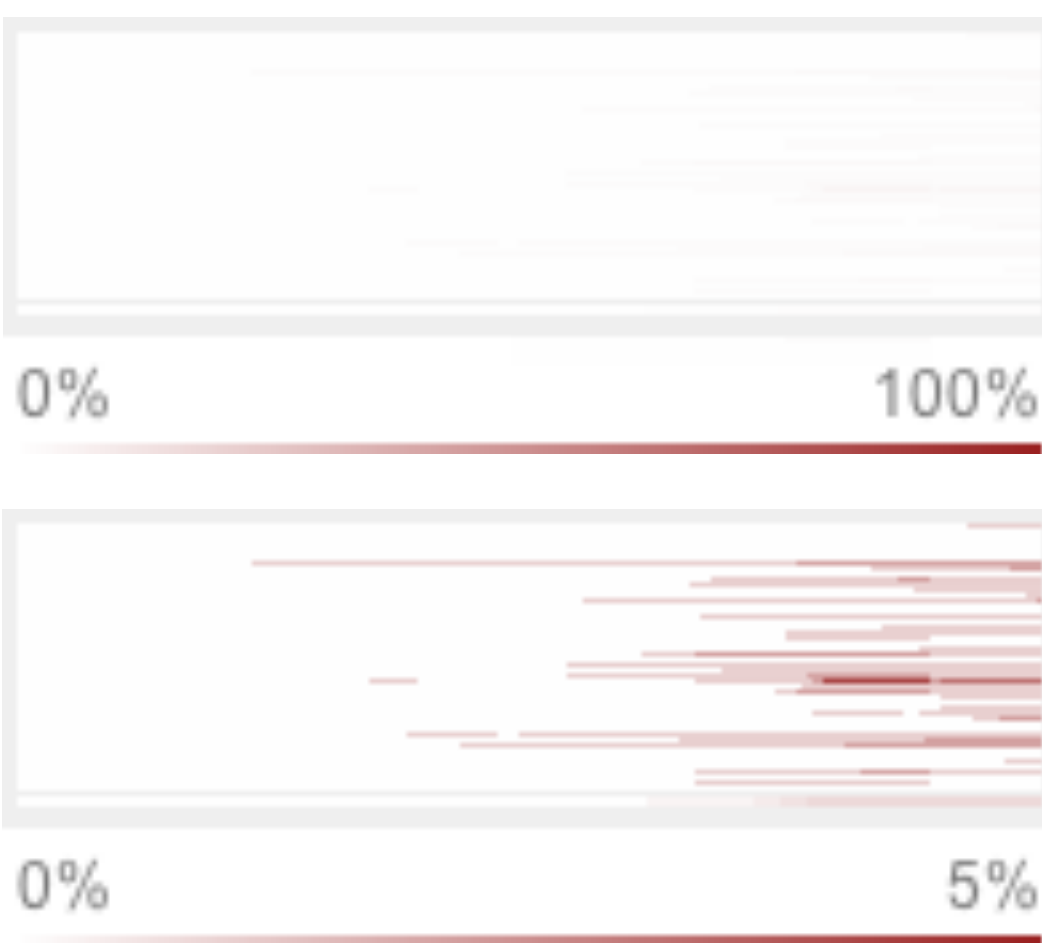
Overall view – all machines: PS



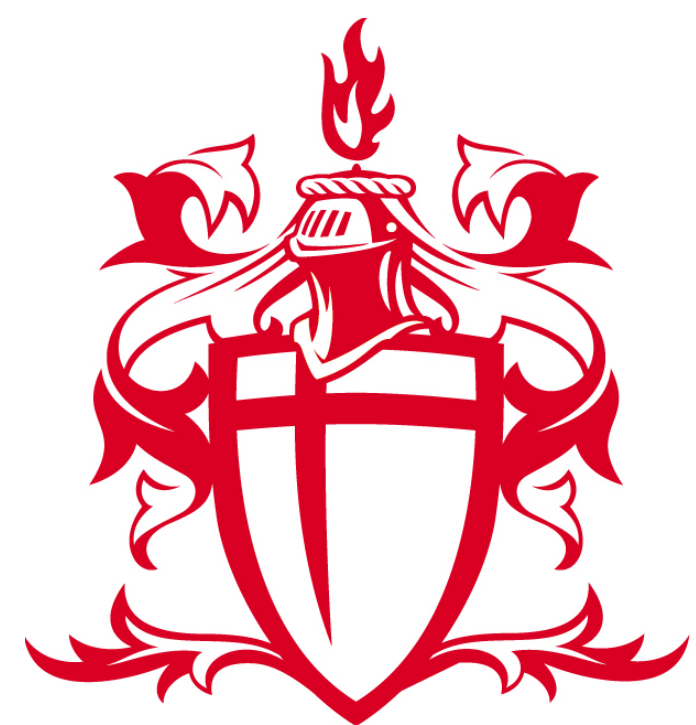
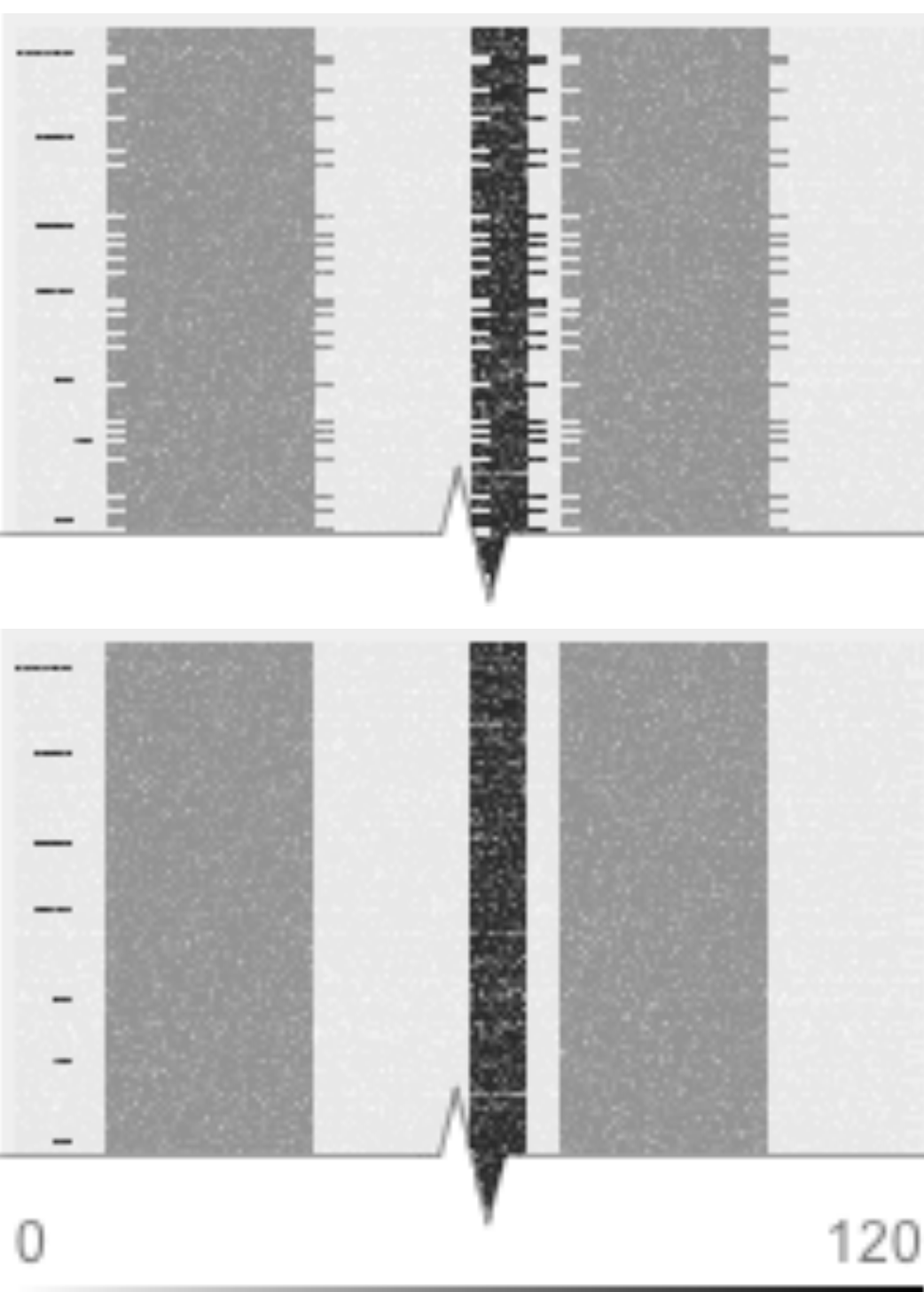
Core features of BOMNetworkStatus VA application

- High density of data in the grid:
 - Snapshot view 24,336 or 16,224 values
 - Temporal view 778,752 values
 - Overall view 64,512 values
- High performance: instant interaction with data, no delays
- No non-informative functional or decorative UI elements; keyboard shortcuts are widely used being more preferred by professionals
- Different levels of data aggregation help finding anomalies by looking at the whole network at once and drilling down to the origin of any problem in seconds
- A choice of views allows both state of the network at a particular moment to be seen and changes of parameters to be monitored over time
- Unified single colour scheme used in the entire application maintains integrity and avoids misinterpretation of views
- Colour scaling in single category temporal view (top-right) helps to highlight hidden trends
- Panning and zooming of the facility grid and columns with machine details allows quickly focusing on areas of concern
- Many ways of ordering and sorting of regions, facilities and individual machines help to reveal hidden and sophisticated correlations and find causes of problems
- Filtering by machine class and function allows monitoring different groups of machines separately and thus localising detected anomalies
- Ability to toggle between universal and local time in temporal view helps to monitor day cycles and investigate natures of anomalies in facilities located in more that one timezone
- The application fits standard 17" monitor (1280×1024 px) and does not require advanced hardware

Colour scaling



Timezone toggling



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Report, video and the app: gicentre.org/vast2012