

1. Analysis of the current state

1.1. Analysis of individual Report Editor Tabs

Report Editor consists of 9 form tabs that accompany the user when creating a new report. These tabs are called: *Columns, Consolidation, Formatting, Styling, Filter, Summary, Charts, Timeline, Preview*.

Each tab contains specific form elements that are mandatory or optional. If the required elements are not filled in, the user is not able to switch to other tabs and cannot complete and generate the new report. The required elements or dependent tabs on each other are:

- Columns – Configure Report Columns, Basic Report Info
- Timeline – depends on selected data from Columns Tab. Timeline tab is not available until at least 1-time field has been selected.
- Charts – depends on selected data from Summary Tab. Charts tab is not available until a sort field has been selected.

These tabs are selection dependent. It means that the number of tabs in the top bar changes when the user chooses this areas in *Columns section-> Configure Report Columns -> Base the report on:*

- Chargeback for Images
- Chargeback for Projects
- Chargeback for Vms
- Metering for Images/Projects/Vms

After selecting these areas, the following form tabs are displayed to the user in the top bar: *Columns, Formatting, Filter, Preview*. In other cases, all 9 tabs are displayed.

Adding a new Report



Figure 1 Preview of Chargeback for Images

Another form change was detected when these areas of interest were selected:

- Performance Clusters,
- Performance Container Nodes, Container Projects,
- Performance Datastores, Hosts, Pods, Providers, Vms, Trends.

After selecting one of these areas, *Performance interval, Average based on or Trending for* labels are displayed at Columns tab -> *Configure Report Columns*. The user can choose from the options offered. The options are the same for almost everyone, but *Performance Datastores* offers only one selection option for the Performance Interval (Daily). Others also offer hourly options.

1.1.1. Columns

Basic Report Info

Basic Report Info is a required area where *Menu Name* label and *Title* label have to be filled in to recognize the new report. *Menu Name* indicates the unique name of the report in menu and *Title* is a report headline.

It is necessary to mention that Basic Report Info area repeats in each tab of the Report editor. This fact has been reported as a bug on a Github page.

Configure Report Columns

This area is the most important part of the Report Editor. It is required, so the user have to choose at least 1 field from the offer. Otherwise, the user is not able to switch to other tabs and complete the report. The whole process takes place in 2 steps:

- The first step: select focus of the Report (Based the report on).
- The second step: select 1 or more fields from dropdown multiple select list of available fields using arrows.

The search engine that is included in *Base the report on* select section searches by letter in a word and do not recognize the beginning of the search word and it does not rank the most suitable results for the user. The letter can be anywhere in a word and then occurs to this example: I will enter "c" and the result is a word "instances" or "bottleneck events".

It should be better to search for words by the initial letter.

Field selection is rather manual work. Search is missing, and user have to use arrows for adding fields into the window below. Another problem comes if a user wants to reset the field selection and start from beginning. There is no option to reset current selection, it must be manually changed by user. There are two options:

- mark all selected fields and move them to the top window.
- choose a different focus of the report and then go back to the previous one.

Report Creation Timeout

This option sets time limit for how long any report can be processed. The user can cancel process after default time limit which is about 1 hour or more.

1.1.2. Consolidation

Group Records by up to 3 Columns / Specify Calculations of Numeric Values for Grouped Records

This area is used to consolidate and aggregate records. It is useful when analyzing data (performance) over a certain period of time. The user can group records by up to 3 columns and specify calculations (e.g. minimum, maximum, average, total) of numeric values for grouped records. Consolidated records do not show the details of the report in the report, but the resulting calculation.

As has already been said, the user can group records by up to 3 columns. This number of columns is explained by technical limitations in the past.

1.1.3. Formatting

PDF Output

PDF Output area sets paper size of final Report in PDF. The user can choose from standard ISO 216 paper sizes or ANSI American formats. A4 format is called as a default but the A0 format is displayed and selected as a first in order.

Specify Column Headers and Formats

This area specifies titles for each header of selected columns from *Columns -> Configure Report Columns* and for numeric values and date/time values is possible to choose format of the data. Numeric values can be converted or may be displayed in currency or suffixed megabytes format. None-numerical values can be displayed in *Human readable* or *Truncated string to 50 Characters with Ellipses (...)* format. If none of the options were chosen, the none option is automatically selected for non-numerical values.

Specify Column Headers and Formats

Column Name	Header	Format
CPU - Peak Usage Rate Avg for Collected Intervals 30 Day High Avg (%)	CPU - Peak Usage Rate	Number, 2 Decimals (1,234.00) ▾
Memory - Peak Usage of Allocated for Collected Intervals Without Host Overhead 30 Day Low Avg (%)	Memory - Peak Usage	Number, 2 Decimals (1,234.00) ▾
Cloud Manager : Host Default Vnc Port Start	Cloud Manager Host D	Number (1,234) ▾
VMs : Disk 4 Partitions Aligned	VM Disk 4 Partitions Ali	<None> ▾

Figure 2 Specify Column Headers and Formats

1.1.4. Styling

Specify Column Styles

Styling area edits style of specific columns to be easy on the eyes. User can choose background color or text color of the column and set conditions for colors in the third "If" column. "If" conditions are evaluated top to bottom for each column. The last column works as a preview for actual settings.

This area has limited color choices that does not match names, and it is not possible to set the background color and text color at the same time. The choice of colors is not entirely appropriate because for example: Yellow text color (#cccc00) is not well readable. The user can also define more than 1 "If" condition but the more conditions user add, the more confused table will be. The situation is captured in the picture below.

Specify Column Styles

Column Name	Style	If			
CPU - Peak Usage Rate Avg for Collected Intervals 30 Day Low Avg (%)	Yellow Text ▾ Yellow Background ▾ Red Background ▾	= ▾ Number < ▾ Number Default ▾	Samp le	Samp le	Samp le
CPU - Peak Usage Rate Avg for Collected Intervals Without Host Overhead 30 Day Low Avg (%)	<Normal> ▾	Default			

Figure 3 Preview of yellow text color and 3 conditions.

1.1.5. Filter

Primary (Record) Filter – Filters the *ColumnTitle* table records and

Secondary (Display) Filter - Filters the rows based on child table fields

Filter area filters data according to user's choices and consists of 2 filters:

- Primary Filter – filter table records of selected column
- Secondary Filter – filter the rows based on child table fields

1.1.6. Summary

Sort Criteria

Sort area contains criteria for sorting data in the Report and it is entry point for *Charts Tab*. The user can choose sort order and which column to sort. Next option is called as a “sort breaks”. If sort breaks are not allowed, then *Specify Calculations for Summary Rows* area is hidden. Otherwise, *Summary Rows* are visible, and user can specify format for the row and choose an option to hide detail rows or not.

Sort Criteria

Sort the Report By	Cloud Manager : Date Created	<Original Value>
Sort Order	Ascending	<Original Value>
Show Sort Breaks	Yes	Hour
Hide Detail Rows	<input type="checkbox"/>	Day
Format on Summary Row	Date/Time (M/D/Y H:M:S Z)	Week
Within Above Field, Sort By	<<< Nothing >>>	Month
		Quarter
		Year
		Hour of the Day
		Day of the Week
		Day of the Month

> Number of Rows to Show All

Figure 4 Preview of Sort Criteria for Report based on Availability Zones

Specify Calculations for Summary Rows

This area specifies calculations for summary rows. The table consists of Column name, Header and Calculations (minimum, maximum, average, total). *Specify Calculations* just display the name of header, so the header has to be changed in *Formatting Tab*, if user wants to change it.

1.1.7. Charts

Chart Settings

Generates different types of graph plotting for selected data (2D donut, Pie, Line, Bars, Columns, Area). Charts tab depends on the *Summary tab* -> *Sort Criteria*. Therefore, the Charts is not available, until the sort field has been selected. Also, some charts may not produce desired results with a single sort field.

Chart settings includes: Chart Type, Chart Mode (Counts or Values), Data Column, Top Values to show and checkpoint for summarization other values.

1.1.8. Timeline

Timeline Settings

Timeline tab is not available until at least 1 time field (e.g. date/time) from *Columns* tab has been selected. This area shows progress in time and if the user requests are filled in, a Sample Timeline preview is displayed.

1.1.9. Preview

Generate Report Preview

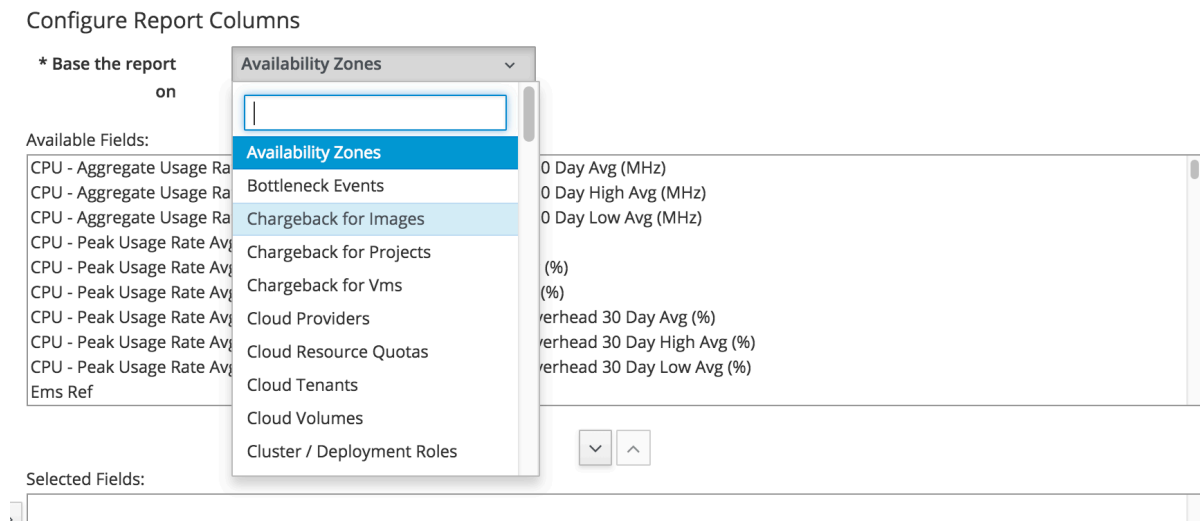
Preview tab is used to display final Report in browser after clicking on the icon. If the user switch to other tabs, Report preview is deleted and must be regenerated.

1.2. Analysis of Report Editor Columns

Report Editor consists of 72 columns which need to be analyzed to fully understanding the issues. Furthermore, these columns include many fields which can be select for the next process (see image below).

The available columns have been grouped in this article into certain groups to reduce the number of columns and what happens in them has been described collectively. If 2 or more columns began with the same term (e.g. EVM), group has been created. Based on this fact, the following groups emerged:

- EVM Group
- Chargeback Group
- Metering Group
- Container Group
- Cloud Group
- Others



EVM Group (Enterprise Virtualization Manager)

- **EVM Audit Events**
 - Date Created, Href Slug, Message, Region Description, Region Number, Event, Severity, Source, Status, Target Class
- **EVM Groups**
 - My Company Tags
 - Tenant
 - Users
 - Users.My Company Tags
 - VM Templates
 - VMs
 - VM Templates. My Company Tags
 - VMs. My Company Tags

- **EVM Users**

- Custom
- My Company Tags
- EVM Custom Attributes
- Requests
- Stamped Approvals
- VM Templates
- VMs

- **EVM Workers**

- CPU %, CPU Time
- EVM Unique ID
- Friendly Name
- Href Slug
- Last HeartBeat
- Memory %, Memory Usage
- OS Priority
- PID, Uri
- Server : CPU %, Drb Uri, Capabilities, Logo, Memory %, Last Hearbeat, Version, Zone Description.

Container Group

Metering Group

- **Metering for Images**

- CPU Cores, Existing Hours Metric, Memory Used, Provider Name, Provider UID, Metering for Image.MyCompanyTags

- **Metering for Projects**

- CPU Cores, Fixed Compute Cost/Metric, Total Cost, Network I/O Used Cost, Provider name, UID, Chargeback for Projects.MyCompanyTags

- **Metering for Vms**

- CPU Cost, Chargeback Rates, Disk I/O Used Cost, Fixed Compute Cost, Fixed Storage Cost, Memory, Provider name, UID, Storage Allocated Cost, Storage Total Cost, Storage Used Cost, Chargeback for Vms.MyCompanyTags

Cloud Group

- **Cloud Providers**

The report is formed by these columns:

- Aggregate data
- CPU
- Custom data 1-9
- Last data (Last Refresh Error, Last Refresh Date, Success Date, Status)
- Memory data
- Total

- MyCompanyTags, Cloud Tenants, Cloud Networks, Availability Zones, VM Templates, VMs, VMs.MyCompanyTags

- **Cloud Resource Quotas**

Tato group focuses on Cloud Resource Quotas, where Resource quotas means maximum number of sources, which you can create for the source type, if these sources are available.

Report is formed by these columns:

- Date, Region, Service, Value, Used, Href Slug, Ems Ref, Name
- Cloud Tenants (date, description, region, type, name, total Vms)
- Cloud Manager (CPU, Custom data, Aggregated data, EVM, Date, Host, Hostname, Last Refresh, Last Metrics, Last Compliance, IP Address, Memory, Total data, Type)
- Cloud Manager.My Company Tags – V2V, Quota, Auto Approve, Migration Group, LifeCycle, Network Mapping, Storage Mapping etc.

- **Cloud Tenants**

This category is able to generate report with these columns:

- Date, href slug, name, region, total Vms, type
- Cloud Networks
- Cloud Resource Quotas
- Flavors
- Provider/Provider.MyCompanyTags
- Security Groups
- VM Templates/ VM Templates.MyCompanyTags
- VMs/VMs.MyCompanyTags

- **Cloud Volumes**

CloudVolumes' technical architecture is a hybrid between layering, application virtualization and containers that enables customers to have high application compatibility while working with existing infrastructure.

- Name, region, lops, Creation time, type, status
- Availability Zone
- Cloud Tenant (Region, Name, Type)
- Hardwares (BIOS, Disk Capacity, IP Address, MAC address, Serial Number)
- Provider/Provider.MyCompanyTags
- VMs/VMs.MyCompanyTags

Chargeback Group

- **Chargeback for Images**

Inform about: CPU Cores Allocated Metric/Cost/Rate, Memory, Network I/O Used, Provider Name, Provider UID, Chargeback for Image.MyCompanyTags: Location, LifeCycle, Department

- **Chargeback for Projects**

CPU Cores Used Cost/Metric/Rate, Fixed Compute 1 Rate, Memory Used, Chargeback for Projects. MyCompanyTags: V2V, Owner, Location

- **Chargeback for VMs**

- CPU Total Cost, Used Cost
- Chargeback rates
- Disk I/O Used Cost
- Fixed Compute Cost
- Memory Allocated Cost, Memory Total Cost, Used Cost
- Provider name/UID
- Storage Allocated, Storage Total Cost, Used Cost
- Vm Guid, Vm Uid
- Chargeback for Vms.MyCompanyTags

Others

Availability Zones

An availability zone is a provider-specific method of grouping cloud instances and services.

Inform about:

- *CPU (aggregate usage rate for child Vms)*
- *Memory (aggregate used for child vms for intervals 30 Day Avg)*
- *Cloud Manager (total subnets, total memory, total hosts, total clusters), CloudManager.MyCompanyTags,*
- *Management Events,*
- *VMs (CPU, Disk 1-9: size, type, mode,, Folder Name, Connection State, Custom, Snapshot name, size, timestamp),*
- *VMs.MyCompanyTags (V2V, Workload, Service Level, User roles)*

Bottleneck Events

Bottleneck identifies the problematic part of the system that works fully within its capacity and can no longer manage it and then slows down the rest of the system.

Include data about: *Asset Name, Context Data, Date Created, Event Type, Future, Href Slug, Message, Region Number, Region Description, Timestamp*

2. User Experience (UX) Analysis

2.1. User Analysis - Persona

To get a design started, there is a need to characterize the kinds of people who will be using the design and especially:

- user goals, tasks,
- the language and words that they use,
- skills at using software.

Of course, the best way to get to know the customer is to meet them personally (Tidwell, 2010). Unfortunately, it is not currently possible because the customers are large foreign companies and communication with them is provided by Red Hat. However, this is not a reason to ignore the customer because without a specific and clear description of those people, the design will proceed with no grounding in reality. (Tidwell, 2010)

The Report Editor is based on an existing solution and available customer information. To describe users was used technique called as a Personas. Personas models target audience and helps to focus on creating a usable product. The picture below describes a fictitious person representing the Report Editor user.

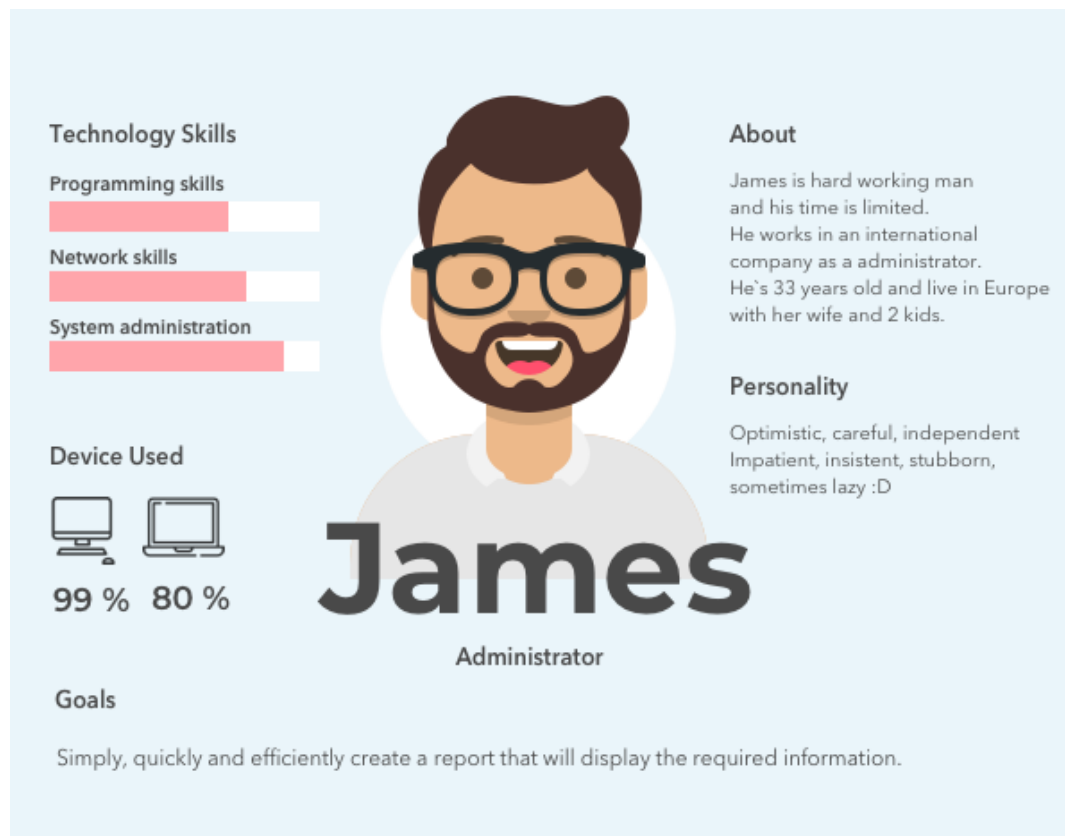
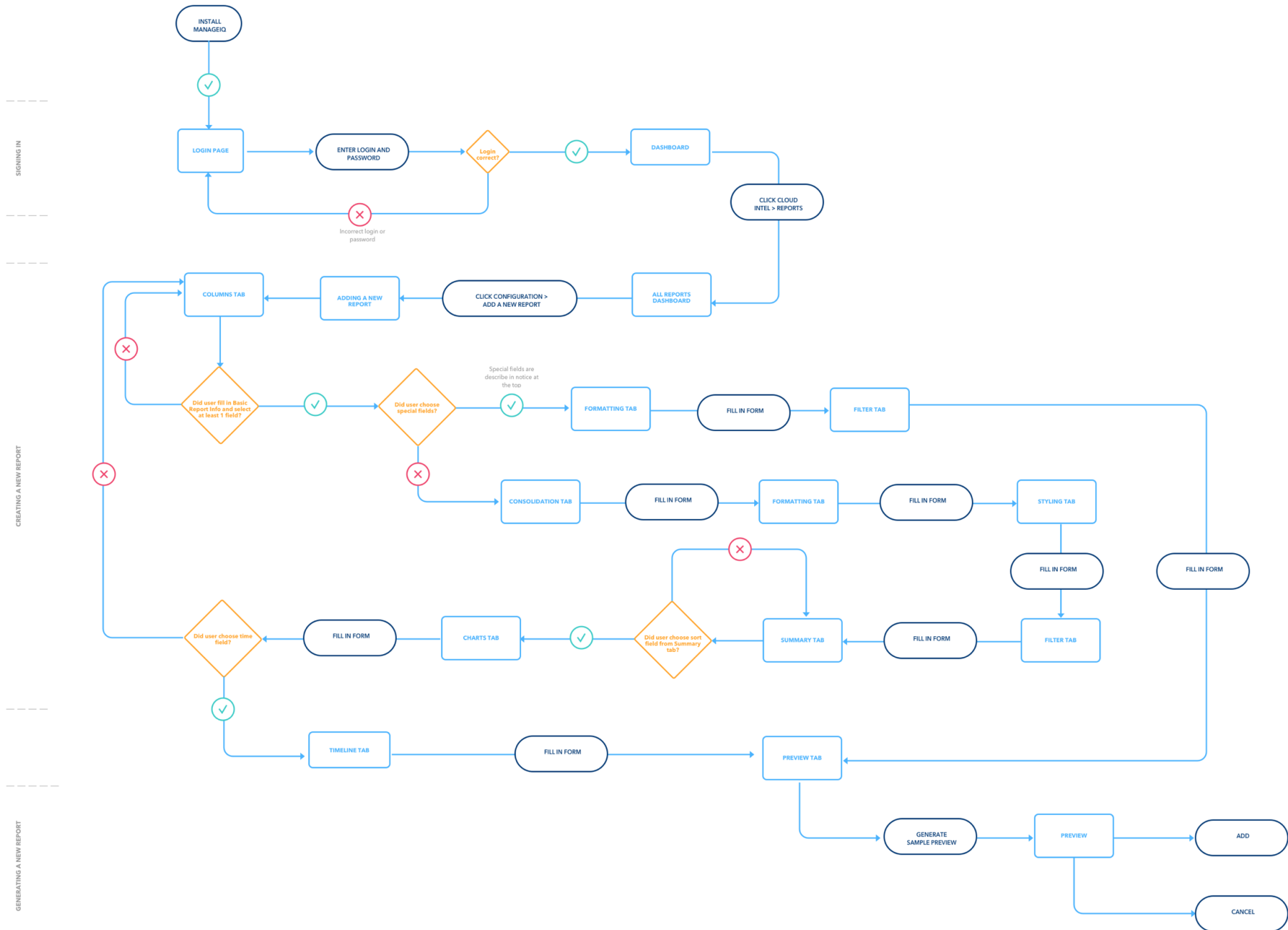


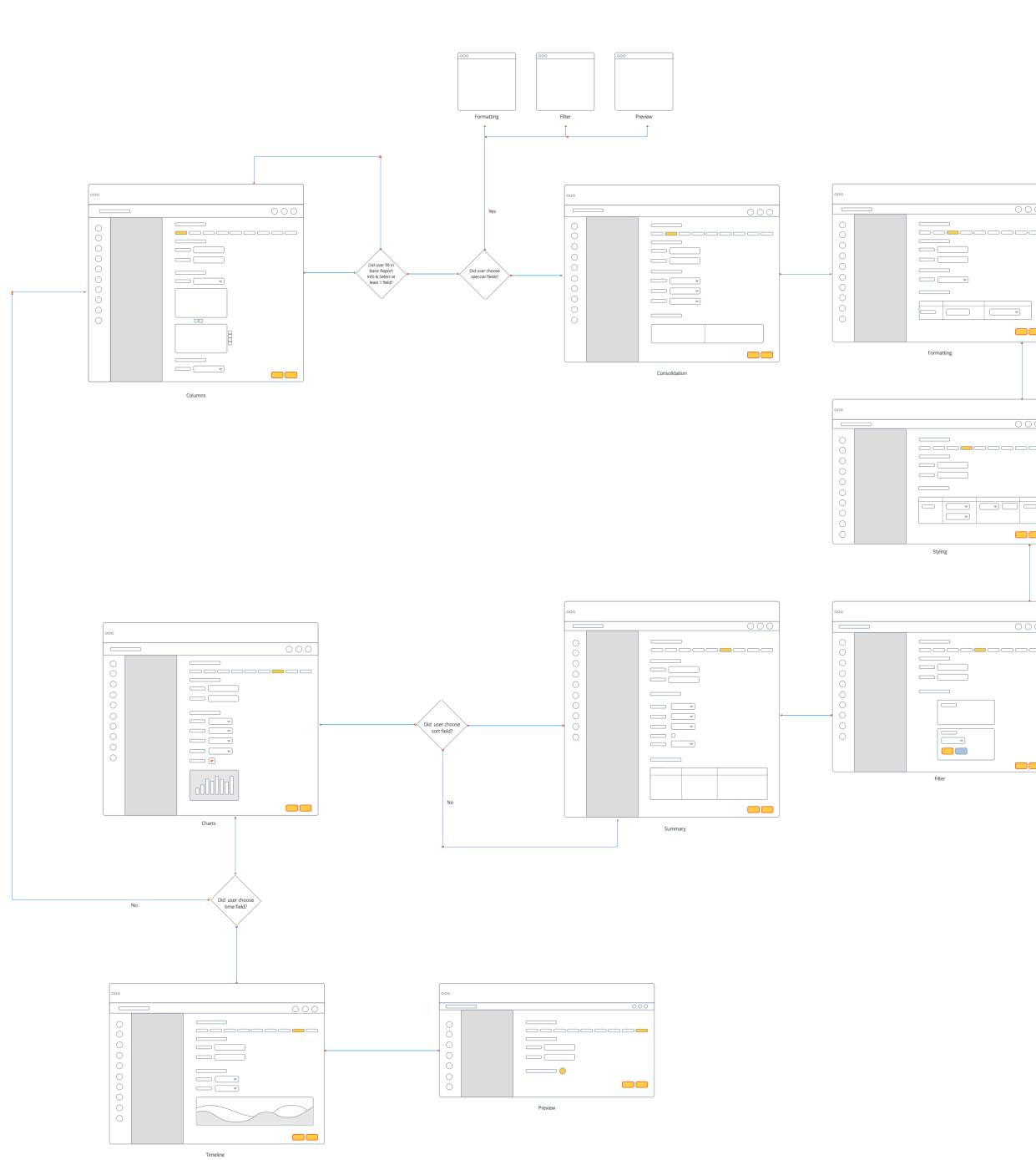
Figure 5 Persona of the Report Editor user (own work)

2.2. User flow diagram

User flow is the path taken by a prototypical user on a website or app to complete a task (Optimizely, 2018). The user flow will take a user from the starting point through a set of steps towards a successful outcome. Adding a new report consists of 3 tasks: *Signing in*, *creating a new report* and *generating a new report*. Progress of adding a new report has been recorded in the picture below.

● Notice:
User can switch between tabs arbitrarily.
Special fields are from Chargeback Group,
Metering Group





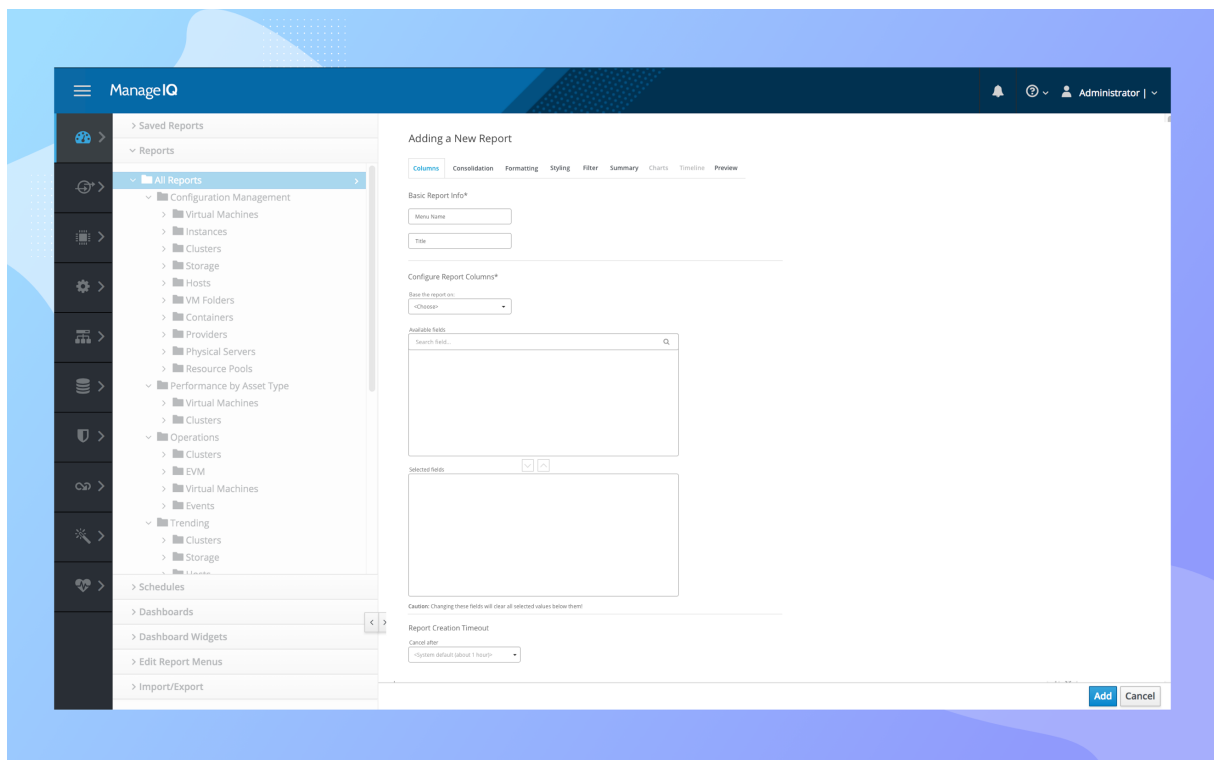
1.1. Form Problems

- neoznačení povinného formulářového pole
- uživatel se dozvídá informace pozdě, viz. přístup k Timeline tabu. Uživatel při vstupu do editor netuší, že má vybrat pole s date/time pro zpřístupnění Timeline tabu.
- chybí vyhledávání, při vyhledávání
- popisky zarovnané vlevo nikoli nad inputem
- varovná okna až po kliknutí na přidání reportu

<https://uxdesign.cc/design-better-forms-96fadca0f49c>

1.2. Design Sketches and Wireframes

1.3. Design User Interface (UI)



Adding a New Report

Columns

Consolidation

Formatting

Styling

Filter

Summary

Charts

Timeline

Preview

Basic Report Info*

Menu Name


Title



Configure Report Columns*

Base the report on:

<Choose>

Available fields

Search field... 

Selected fields

Note:

Report Creation Timeout

Cancel after

<System default (about 1 hour)>

Adding a New Report

Columns

Consolidation

Formatting

Styling

Filter

Summary

Charts

Timeline

Preview

Basic Report Info*

Menu Name

Report

Configure Report Columns*

Base the report on:

<Choose>

Availability Zones

Chargeback for Images

Chargeback for Projects

Chargeback for Vms

Selected fields

Note:

Report Creation Timeout

Cancel after

<System default (about 1 hour)>

Adding a New Report

Columns

Consolidation

Formatting

Styling

Filter

Summary

Charts

Timeline

Preview

Basic Report Info*

Menu Name

Report

Configure Report Columns*

Base the report on:

Availability Zones

Available fields

Search field...

Memory

Cloud Manager

Selected fields

Management Events

CloudManager.MyCompanyTags

VMs

VMs.MyCompanyTags

Note:

Report Creation Timeout

Cancel after

<System default (about 1 hour)>

<https://www.optimizely.com/optimization-glossary/use>

