Improve processes with Optimize

Optimize offers business intelligence tooling for Camunda customers. By leveraging data collected during process execution, you can access reports, share process intelligence, analyze bottlenecks, and examine areas in business processes for improvement.

With Optimize, review heatmap displays for instances which took longer than average to discover long-running flow nodes. As a result, reap actionable insights and rapidly identify the constraints of your system.

Set up

Within Camunda 8, you can launch Optimize from Console — the interface where you can create clusters, and launch both Operate and Tasklist. Therefore, ensure you've created a Camunda 8 account before getting started with Optimize for SaaS users.

NOTE

So long as you are operating with Camunda 8 1.2+ when creating a cluster, you can access Optimize. From here, Optimize requires no additional set up. You can immediately obtain process insights as Optimize already continuously collects data for analysis.

Once you've created a cluster, click the square-shaped icon in the top left corner of the page and select **Optimize**.

You can begin analyzing reports and dashboards with just two process versions. However, the more process versions you work with in Optimize, the more performance attributes and data trends you'll be able to study. For the purposes of this guide, we've preconfigured several processes to demonstrate Optimize's capabilities.

Create and analyze dashboards

Within Optimize, **reports** are based on a *single* visualization, similar to a single chart or graph. **Dashboards** are aggregations of these visualizations, similar to a full spreadsheet of data collections, or a combination of several comparative charts and graphs. **Collections** are groups of these data sets, similar to project folders for organizational purposes where we can nest a series of dashboards and/or reports within.

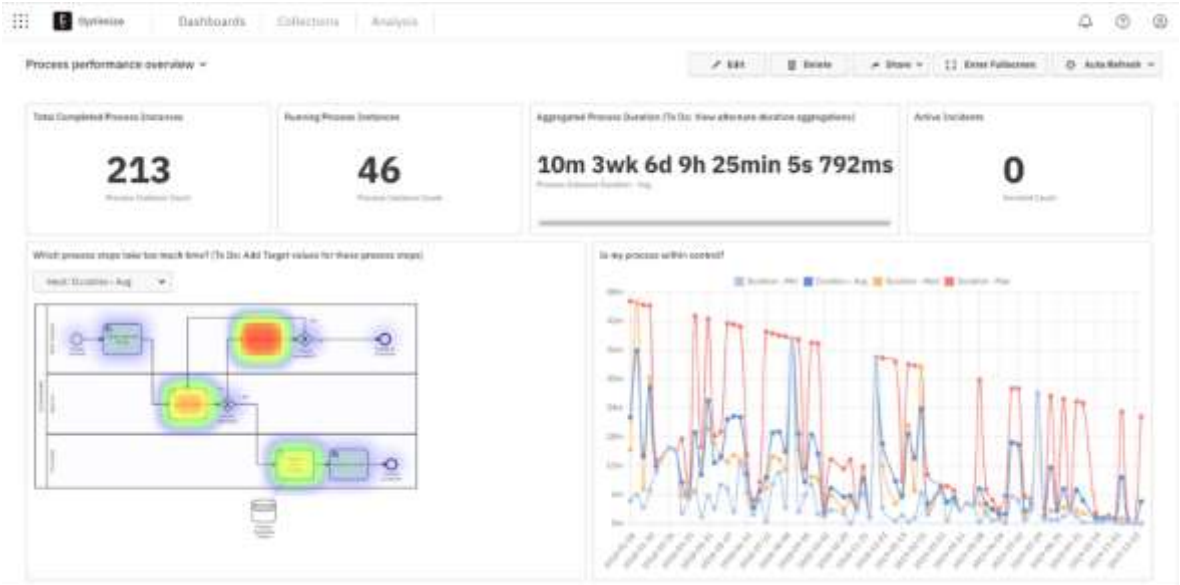
Once you open Optimize, you'll first view the homepage for these collections, dashboards, and reports.

To create a collection on the **Home** page, select **Create New > Collection**. Then, you can name your collection and select which data sources and processes will be available. Note that you can select up to 10 processes at once.

From within your collection, you can again select **Create New** and draft reports and dashboards. Add users and additional data sources by navigating between the tabs inside the collection.

Let’s create a dashboard inside our first collection. Take the following steps:

1. Return to the **Home** page to view a list of existing collections, dashboards, and reports. You’ll be able to view all process instances you’ve already run and retrieve additional data on these instances within the Camunda engine.
2. Select the collection where you’d like to create a dashboard.
3. Click **Create New > New Dashboard**.
4. Optimize offers preconfigured dashboard templates, or you can start from a blank dashboard. In this example, we’ll select a preconfigured template by clicking the **Process performance overview** option. Note that you can also create dashboards with multi-process templates.
5. Under **Select Process**, choose the process you’d like to analyze and the version.
6. Click **Create Dashboard**.
7. Name your dashboard, and add any additional existing reports or create filters. Click **Save**.



In the sample above, Optimize drafted a dashboard filled with reports for review. These reports include objectives like process instance counts, aggregated process duration, active incidents, and heatmaps.

Select **Edit > Add a Report** to incorporate additional reports you've already created (see create and access reports below). Click and drag the reports on the grid to arrange the dashboard to your liking.

NOTE

Optimize offers collaborative capabilities, too. Click the **Share** tab to share your dashboard. Toggle to **Enable sharing**, and copy or embed the provided link. Colleagues without access to Optimize can still view your report with the shared link.

Create and access reports

To create a custom report based on a key performance indicator (KPI) you'd like to analyze, and to incorporate this report into a dashboard, follow the steps below:

1. On the right side of the **Collections** page, select **Create New > Report**. Here we'll take a look at a single process, though you can also view data from multiple processes.
2. Click the text box under **Select Process** and select the process you'd like to analyze.
3. Select the type of report you'd like to use on the right side of the **Create new Report** box. As with dashboards, Optimize offers preconfigured templates such as heatmaps and tables. We'll begin with a heatmap.
4. Click **Create Report**.
5. Set up and customize your report. Begin by naming your report in the text box at the top of the page, pre-filled with **New Report**.
6. In the gray text box to the right, confirm your data source, and select what you'd like to review from the process (in this case, we are viewing flow nodes.) You can also group by topics such as duration or start date.
7. If you'd like, filter the process instance or flow nodes. For example, you can filter by duration, only viewing process instances running for more than seven days.
8. Finally, you have the option to view particular sets of data from the instance, like instance count or absolute value, by selecting the gear icon to the left of your data customization. You can also choose how you'd like to visualize your data in the box beneath **Visualization** (i.e. bar chart, pie chart, etc.). Once you've made your selections, click **Save**.

Alerts

You don’t have to log in or view reports and dashboards to be alerted that something may need correction or further analysis in your process.

For this purpose, you can create new alerts for reports within your collections. These alerts watch reports for you among collections, and email you an alert if a set outlier occurs in your process flow.

To create an alert, take the following steps:

1. Create a report with a number visualization inside a collection for a KPI you want to track.
2. Inside your collection, select the **Alerts** tab.
3. Select the type of alert you would like to receive. For example, you can receive an email notification when the backlog on your bottleneck becomes too high.

As you’re notified, you can begin to examine if the process is broken and if additional teams need to be notified.

Collections

Within your collection, you can also access the **Users** and **Data Sources** tabs to further customize your collection.

Users

Within the **Users** tab, review the users and user groups with access to your collection.

Select **Add** to search for a user or user group to add, of which may be assigned as a viewer, editor, or manager.

Data sources

Within the **Data Sources** tab, review and add source(s) of your data to create reports and dashboards inside the collection.

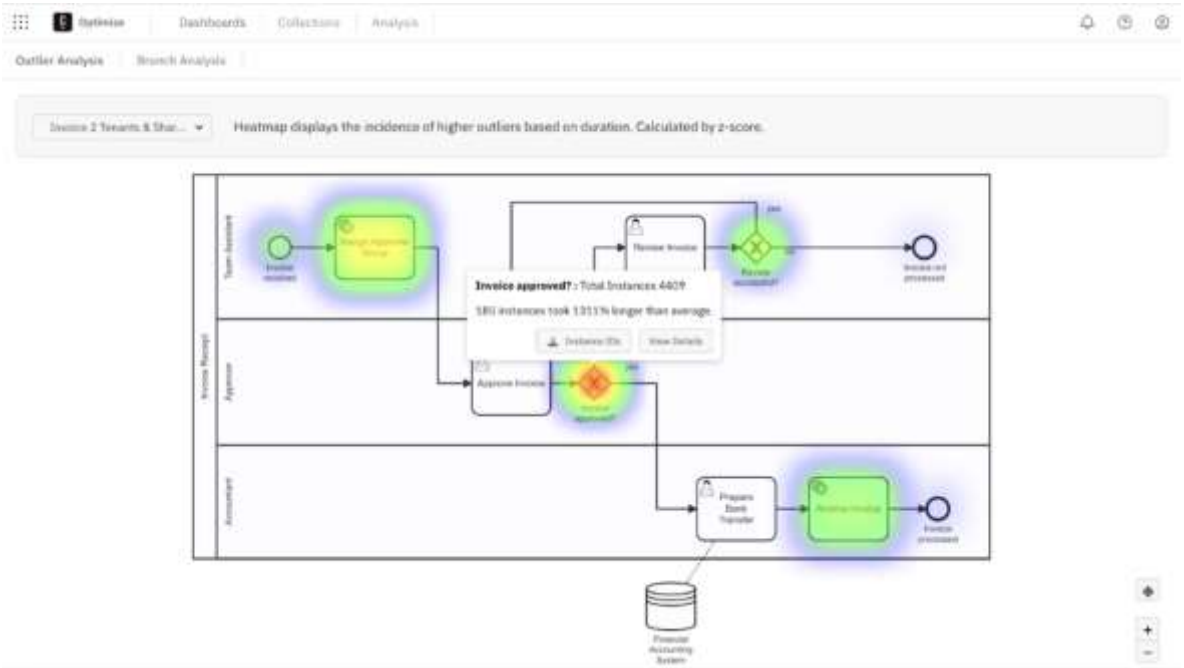
Additional analysis

Now that we've created data sets within the **Home** page, let's shift into the **Analysis** tab.

Inside this tab, you'll notice **Task Analysis** and **Branch Analysis**.

Task analysis

Inside **Task Analysis**, we utilize heatmap displays. Click **Select Process**, choose your process, and choose your version.

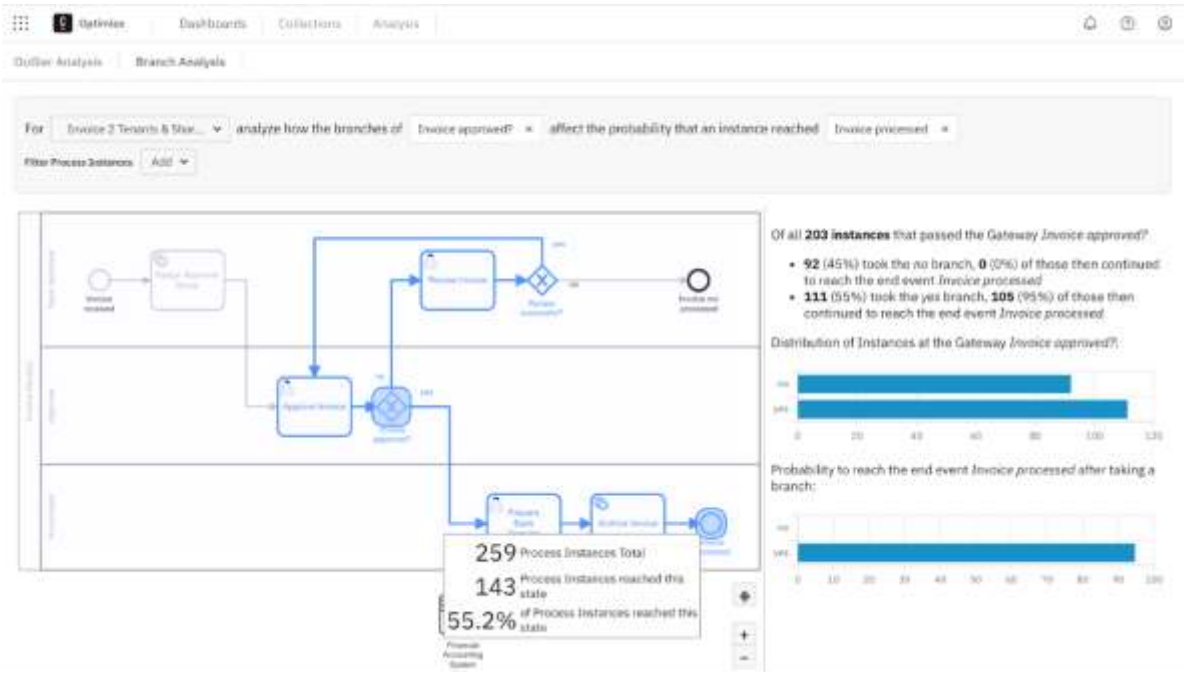


Within the example above, we notice increased heat (recognized as red) surrounding our invoice approved gateway. Several instances have taken significantly longer than average, so we may choose to take a closer look at these instances by downloading the instance IDs, or viewing the details for further analysis. Here, you can also find if the outliers have a shared variable.

Branch analysis

Inside the **Branch Analysis** tab, we can select a process and analyze how particular gateway branches impact the probability of reaching an end event.

Fill in the process field, click on a gateway, and choose your end event. In the example below, we can further analyze the likelihood of an invoice being processed once it reaches the gateway for approval:



Here, we've selected a process flow, gateway, and endpoint for a breakdown of all the instances that went through a particular gateway to a specific endpoint. Hover over the gateway for a breakdown of the process itself.

The Ultimate Guide to Solving Bottlenecks with Camunda

A chain is only as strong as its weakest link.

What is the weakest leak in your business process?

We'll explore how to use Camunda Optimize to leverage best practices from the manufacturing industry to find and fix problems in your business processes scientifically.

The Theory of Constraints

The main idea is that every process has one constraint that limits its flow. I'll use "constraint" and "bottleneck" interchangeably through this document.

It's the slow walker in a group of tourists.

It's the overworked teammate that everyone asks for help.

It's the manual process where everything else is automated.

Sometimes, it's a literal **bottleneck**.

The Theory of Constraints introduces two rules about process performance, specifically process throughput.

1. The constraint limits throughput.
2. Any improvements outside the constraint will not lead to improved process performance.

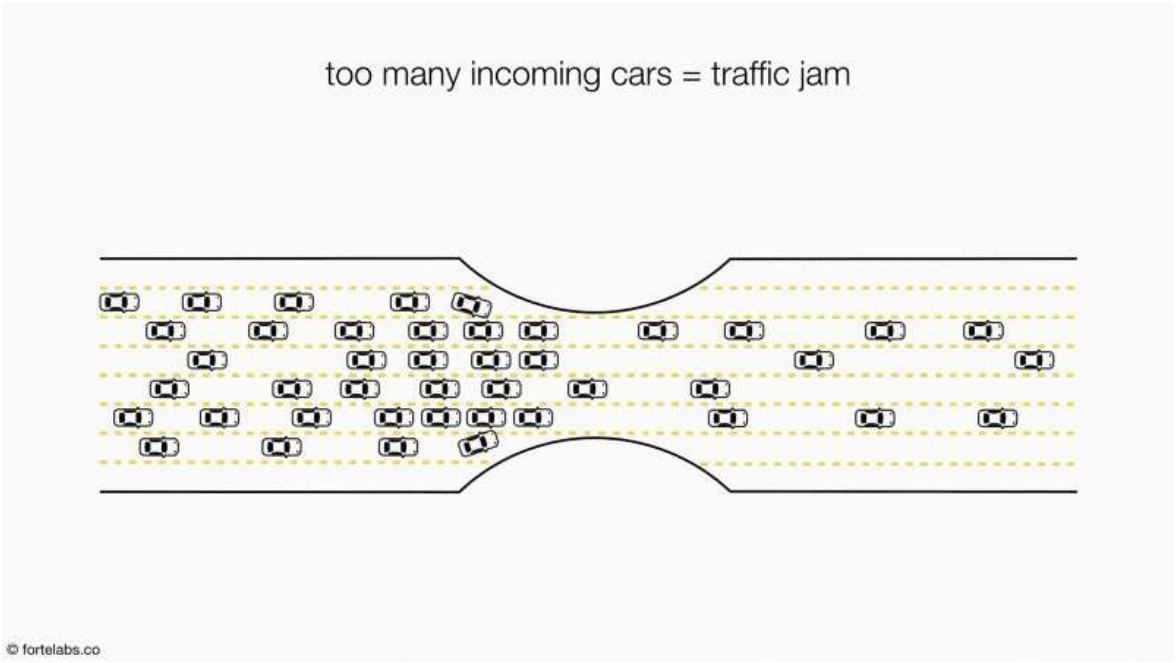
In other words, if you want to improve a process's throughput, you only have to improve performance at the constraint.

You don't make your team more productive by giving more work to the person who already has a massive backlog of requests.

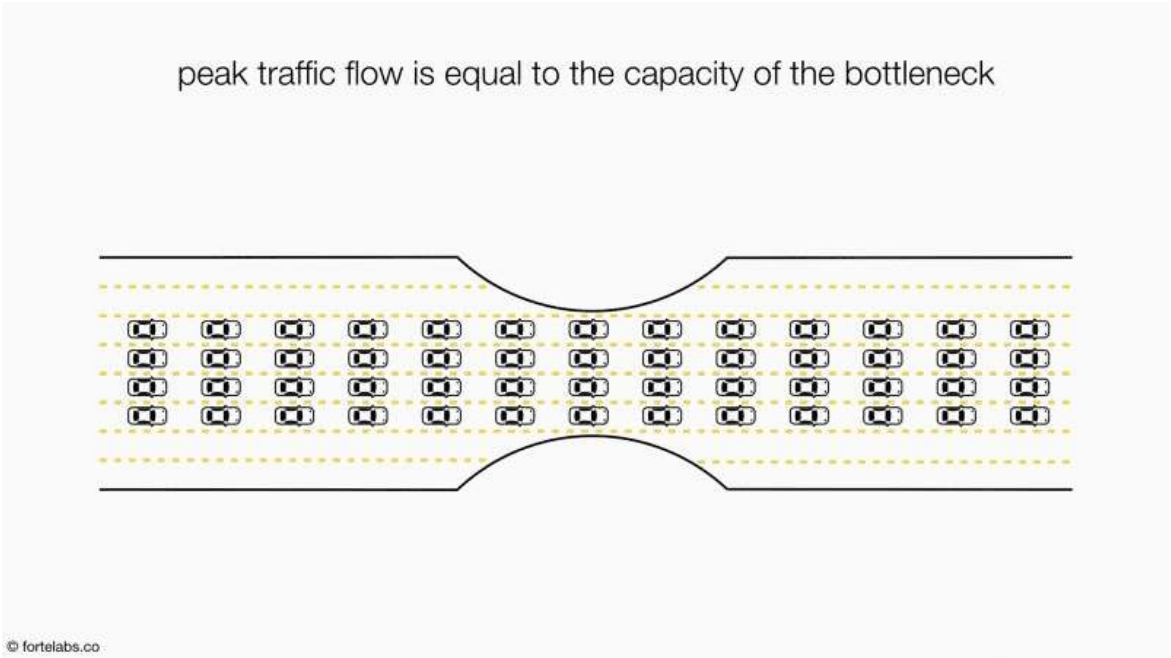
Here's a **quick example from Tiago Forte**, a productivity expert.

He uses the analogy of lanes of traffic in a highway to describe bottlenecks.

Using all available lanes in a highway before half of them are closed off will cause merging traffic to slow down.



However, with the smooth flow of traffic, the capacity of the bottleneck increases substantially.



But how do you identify the bottleneck?

And what can you do to fix it?

Let’s switch to Optimize.

Optimize and the Five Focusing Steps

The Theory of Constraints provides a framework called the **Five Focusing Steps, a Process of On-Going Improvement**.

We're assuming you're running Optimize 3.6.0, which includes the latest dashboard templates to help you recreate this workflow with zero configuration. If you don't have Optimize, here's a quick guide on how to **install it**.

Step 1: Identify the constraint

Optimize is purpose-built for helping you rapidly identify the constraints of your system. In a new collection, create a *Human Task Bottleneck Analysis* dashboard. This dashboard is available with Optimize 3.6.0, so you'll need to upgrade to get this configuration. Screenshots will also be provided below so you can recreate each of these reports on older versions.

I'll demonstrate the process of identifying your bottleneck and share sample visualizations.

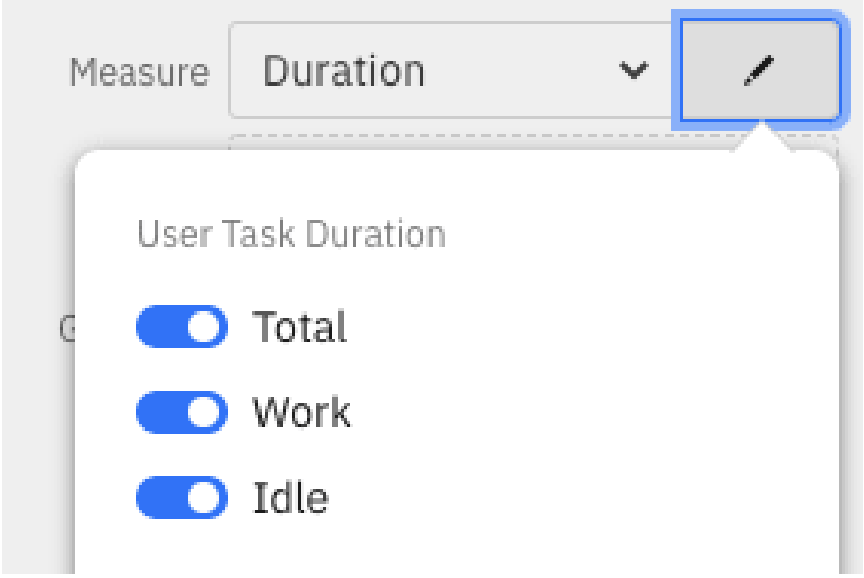
Where is my constraint?

The first step is to discover the source of the bottleneck.

One way to identify a bottleneck is to see where work is piling up. You can visualize this using the *Unassigned Tasks* heatmap, which shows how many unassigned tasks are waiting at each flow-node. You can create this by viewing the user task count, grouping by user tasks, filtering to show flow-nodes with an assignee of “unassigned” and selecting the heatmap visualization.

Another way of identifying a bottleneck is by seeing how long a task waits before someone claims it, which will be shown as part of the *Total, Work, and Idle Durations* heatmap. You can reproduce it by viewing user task total, work and idle duration, grouped by user task with the heatmap visualization. There are two main things you can do with this heatmap:

1. If you’re viewing the report, you can toggle the heatmap by showing the total, work and idle durations for a process instance. The heatmap will light up different parts of your process depending on whether tasks are labor-intensive (long “work” duration) or have a longer backlog (long “idle” duration).
2. You can set targets. On average, how long do you want your process instances to spend in each status (total, work or idle) in each of these steps? We can revisit this step later.


Measure
Duration
User Task Duration
Total
Work
Idle

What is the root cause of my bottleneck?

First, we need to isolate the root cause for our bottleneck.

Many types of constraints could be the root cause. Here are a few examples of each type in a Camunda context.

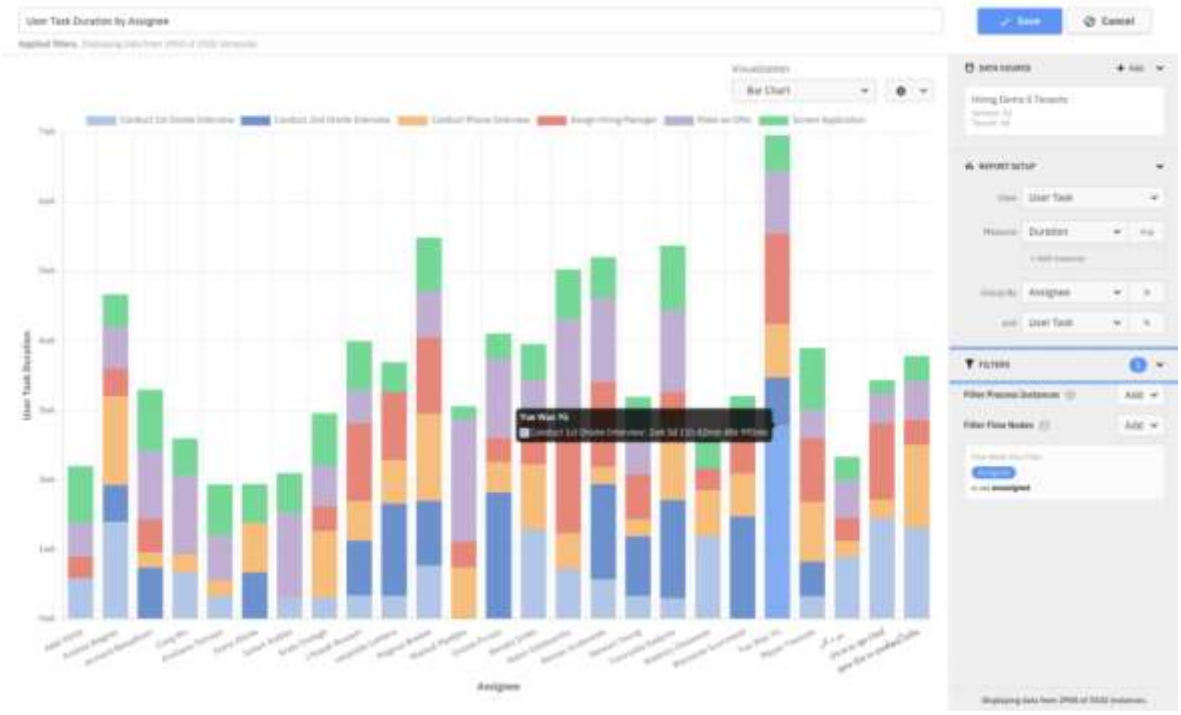
- *Resource* – The number of workers able to perform tasks or your Camunda Engine's capacity
- *Practice* – Legal or the company requires a manual review of a business process or has a long-held belief in an inefficient process
- *Long-Term* – Customer demand for your service/product or the business process's level of automation

Optimize is designed to help you perform quantitative analysis. Specifically, you can evaluate how much performance varies by task assignee or a variable created in the Camunda Engine.

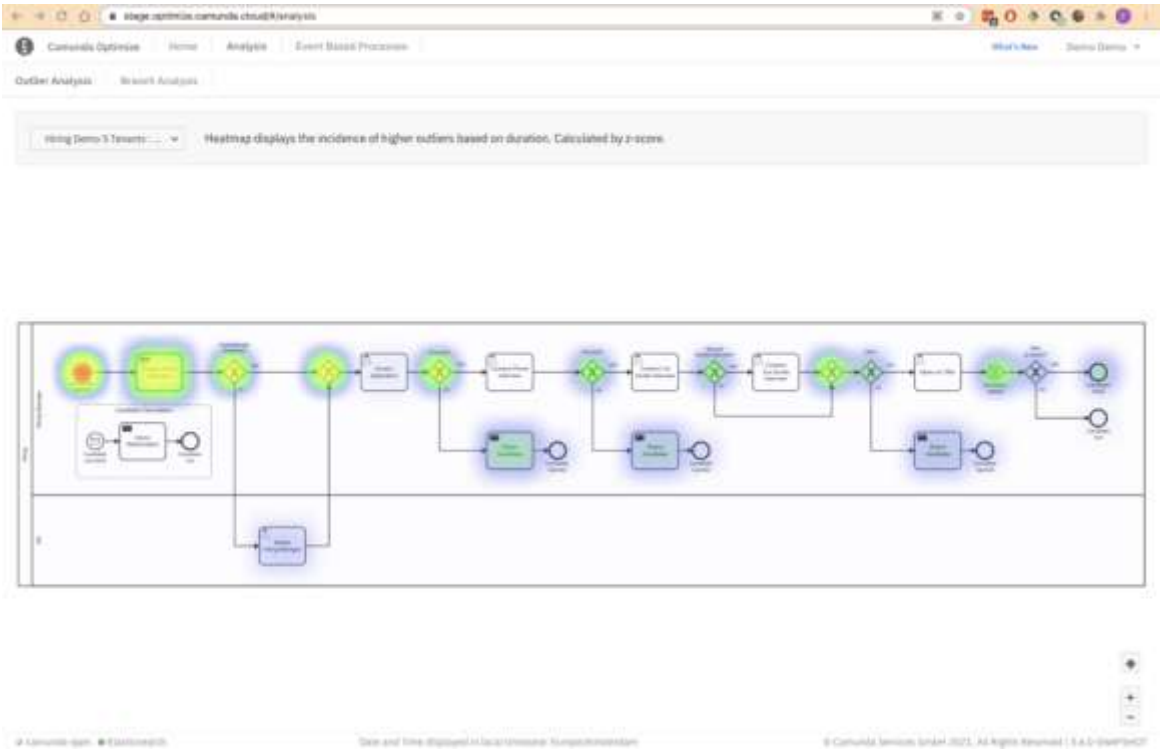
The first step is to explore variation in duration among task assignees. High variance suggests an uncontrolled, unpredictable process. The goal is not to evaluate performance but try to figure out what's happening so you can standardize best practices.

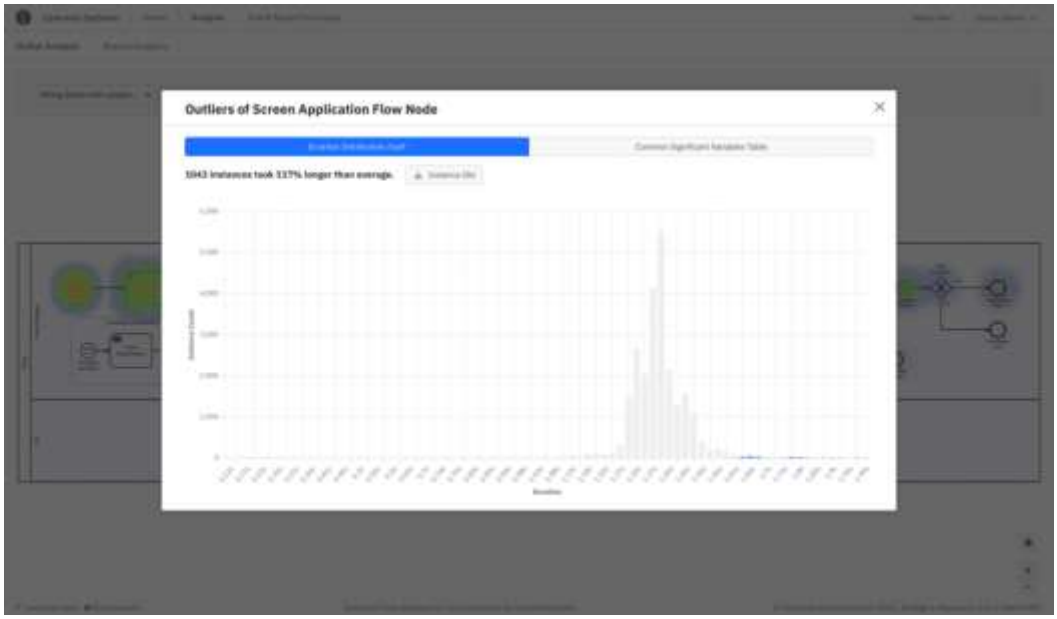
The following graph to view is the *User Task Duration by Assignee* bar chart, which groups data by user task, filters out any unassigned tasks (we've discussed those already), and stacks the bars (see the settings cog for more information).

With a stacked bar chart (new in Optimize 3.6.0), you can see which users work quicker than others and understand the amount of variance in each task. If the bars in the stack are about the same size across the chart, you have a standardized process. However, this example shows a high variation in task duration among different assignees. This information might spark some interview questions to get to the bottom of the issue.



The second step is to evaluate your data for outliers and see if variables are the likely root cause in the *Outlier Analysis* feature. As you can see in the example, this is a heatmap that lights up the flow-nodes where outlier process instances take an abnormally long time to complete. Clicking into the details of a bright node shows you a *distribution of duration* and tries to find if the outliers have a shared variable.





Outliers of Screen Application Node

Duration Distribution chart | Common Significant Variables Table

Total Instances: 34076

Number of Outlier Insta...	% of Total Instances	% of Outlier Instances	Variables
580 instances Instance IDs	1.7	55.88	team=engineering
241 instances Instance IDs	0.7	23.21	team=marketing

You know the problem. Now, it’s time to solve it.

Step 2: Exploit the Constraint

Armed with the root cause of your bottleneck and the visualizations as evidence, you can sit down with the business and technical experts to figure out a solution. You can “exploit the constraint” by using existing resources to improve performance.

Improve efficiency

Typical process improvement efforts focus on improving efficiency and eliminating waste.

This step involves zooming in on the particular process step, figuring out the best way to accomplish it and then standardizing this best practice. You can model the best way to complete a specific process in Camunda by creating a **subprocess**. Subprocesses can represent additional detail for critical steps. In addition, Optimize will have duration data for each step in the subprocess, providing fine-grained performance data.

During a brainstorming session, business experts should be able to propose a set of changes that might include:

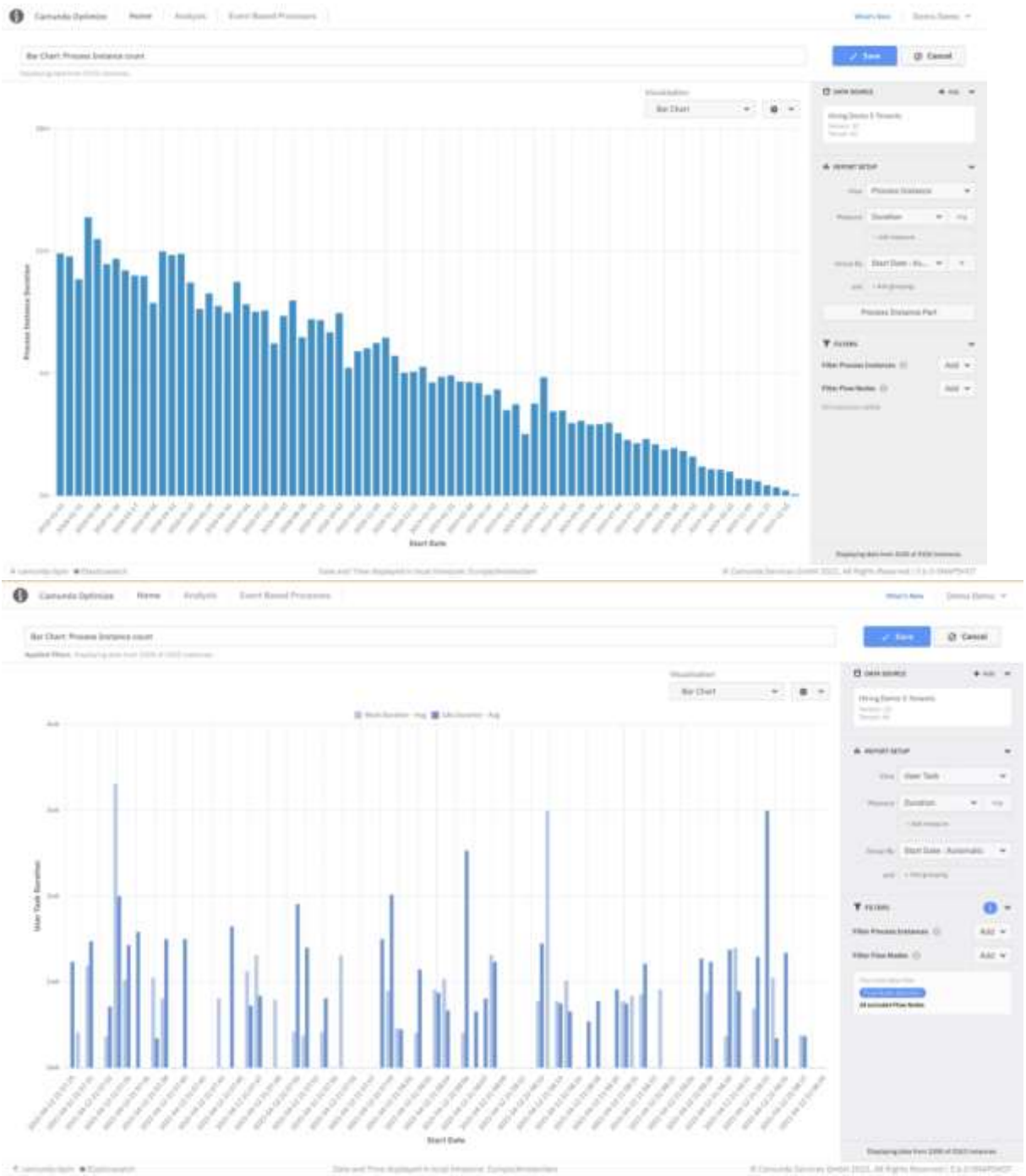
- Providing detailed instructions with the tasks
- Training all workers on how to accomplish tasks at the bottleneck
- Setting performance standards

These incremental changes should result in increased efficiency and throughput at the bottleneck. Once you’ve chosen the solution, it’s time for implementation and monitoring.

Monitor progress

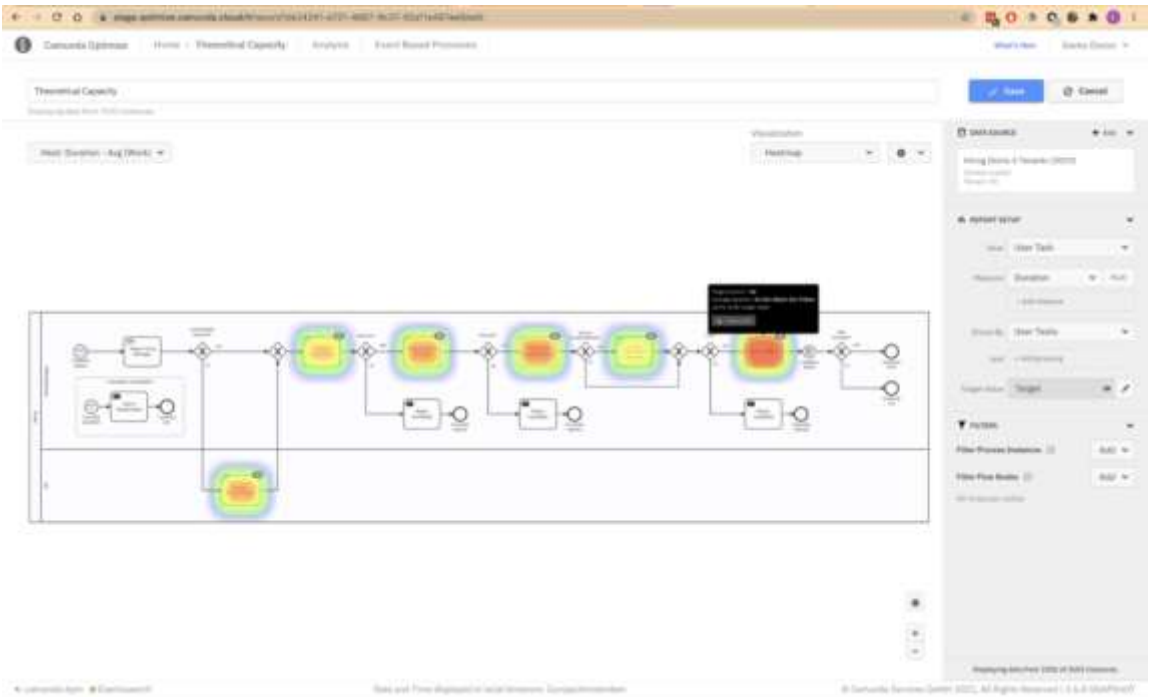
While reviewing whether these changes cause their desired effects, you might not see them solved immediately. Instead, you'll want to be able to track improvements and know when to intervene to keep the process running.

Your primary tool will be a user task duration report on the bottleneck. This report shows user task duration over time with a flow node data filter to only show data from your bottleneck. A downward trend means your process changes are working.



Another way to quickly identify issues is by setting a target value. For example, when viewing a user task heatmap, you can quickly see where the average duration on a

flow node is above your target. Then, Optimize compares the actual data (e.g., average work duration) against the target and lights up the heatmap based on how big the percentage difference is.



In addition, consider creating a report with the number of unassigned tasks at the bottleneck and creating alerts when the number is too high or too low. Both scenarios are problematic. If the number is too high, the bottleneck is preventing the flow of work. If it’s too low, the bottleneck is unproductive, and you should provide work to the bottleneck in smaller batches.

Step 3: Subordinate Everything to the Constraint

If the local changes to the bottleneck don't have the desired effects, it's time to think broader. There's a good chance some of the work done in this bottleneck can be automated, done at another step or removed entirely.

Holistic process improvement

Subordinating everything to the constraint requires a holistic understanding of the process. Business and technical experts should gather around the process diagram to identify ways to shift work to improve process performance. Some solutions that might come out of this discussion could be:

- Provide an uninterrupted list of actionable tasks in **Tasklist** or an equivalent format
- Use a **DMN table** to send simple tasks to an automated workflow step, reserving your team's expertise for more challenging tasks
- Move data collection earlier in the workflow
- Perform quality control earlier in the workflow

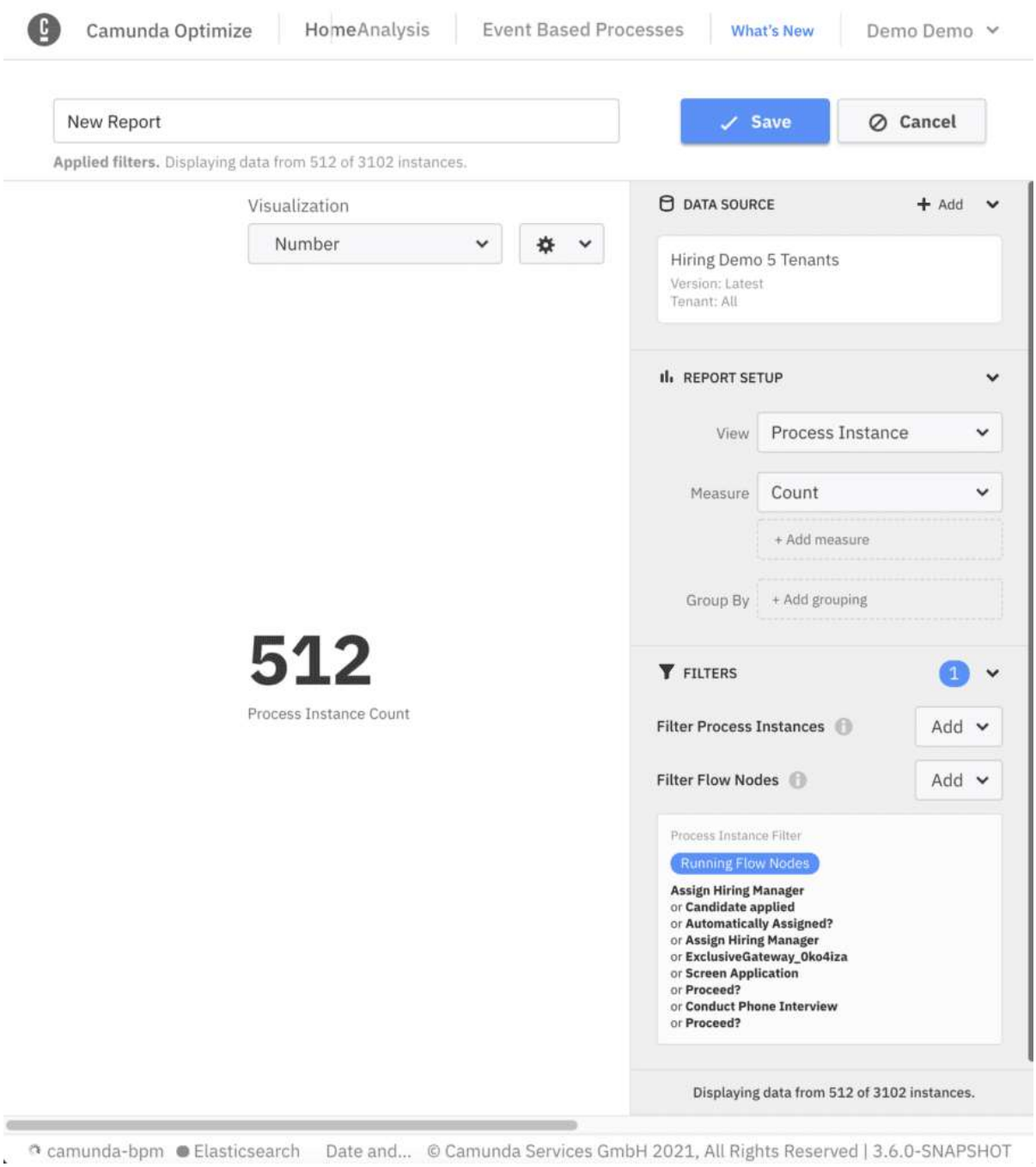
Preventing bottlenecks

In addition to identifying an existing bottleneck, business users can use Optimize to identify when bottlenecks are likely to happen.

Smooth-running processes have uninterrupted flow and low amounts of work in progress (WIP) outside of the bottleneck. On the other hand, chaotic processes with large batches will make forecasting problems or tracking improvements difficult.

Consider creating reports and alerts to track WIP in front of the bottleneck. Accumulating work before the bottleneck can lead to it receiving a large batch of work and slowly processing it.

Let’s go to our hiring demo example. If the first round interview is the known bottleneck, then the number of process instances in progress is a concern but the bottleneck hasn’t been reached. This report shows all applicants up to just after the phone interview.


Camunda Optimize
HomeAnalysis
Event Based Processes
What's New
Demo Demo
New Report
Save
Cancel
Applied filters. Displaying data from 512 of 3102 instances.
Visualization
Number
DATA SOURCE
Add
Hiring Demo 5 Tenants
Version: Latest
Tenant: All
REPORT SETUP
View
Process Instance
Measure
Count
+ Add measure
Group By
+ Add grouping
512
Process Instance Count
FILTERS
1
Filter Process Instances
Add
Filter Flow Nodes
Add
Process Instance Filter
Running Flow Nodes
Assign Hiring Manager
or Candidate applied
or Automatically Assigned?
or Assign Hiring Manager
or ExclusiveGateway_0ko4iza
or Screen Application
or Proceed?
or Conduct Phone Interview
or Proceed?
Displaying data from 512 of 3102 instances.
camunda-bpm
Elasticsearch
Date and...
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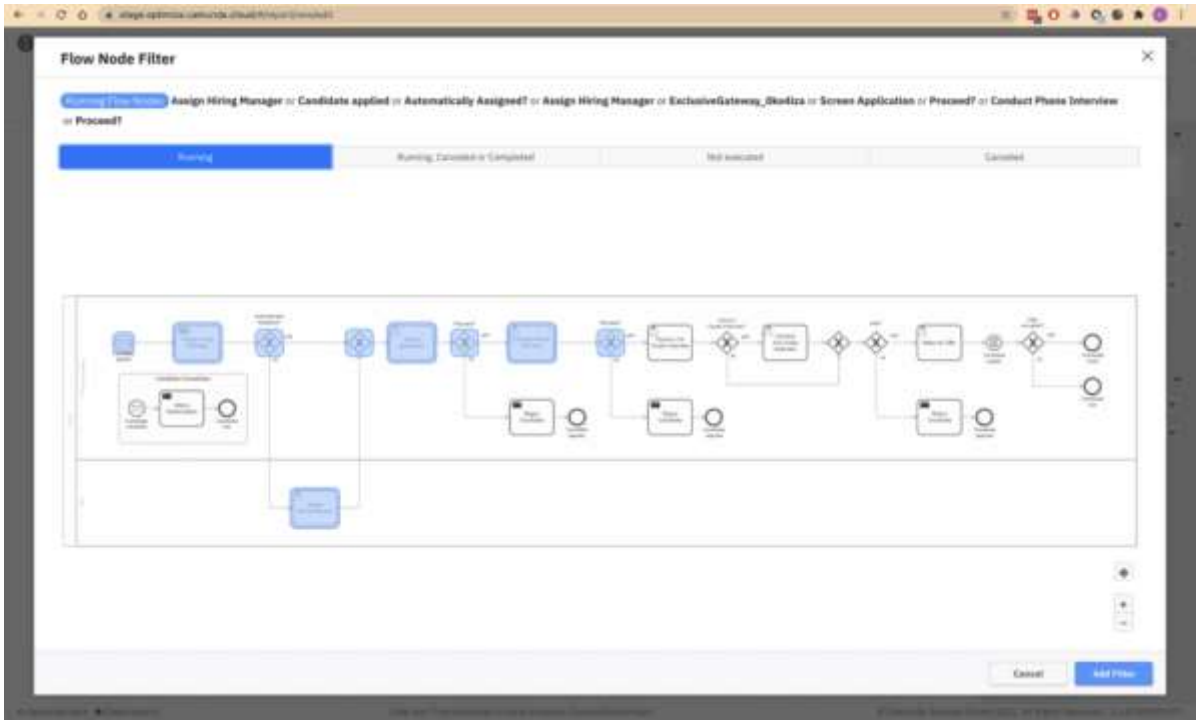

Flow Node Filter
Assign Hiring Manager or Candidate applied or Automatically Assigned? or Assign Hiring Manager or ExclusiveGateway_0kod1za or Screen Application or Proceed? or Conduct Phone Interview or Proceed?
Running
Cancel

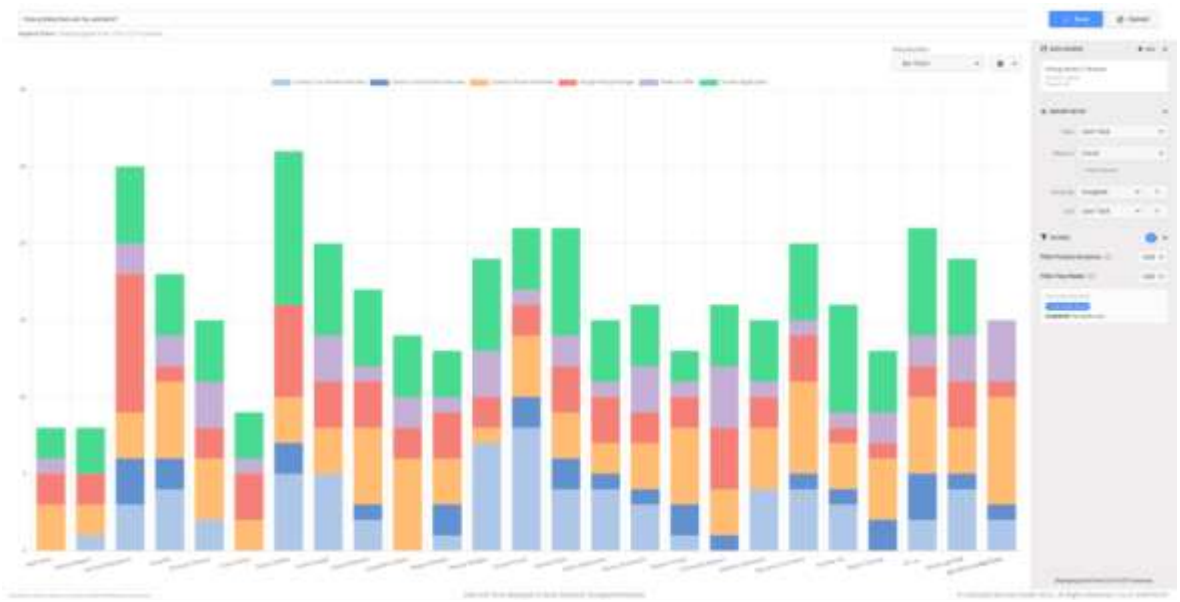
Step 4: Elevate the Constraint

If you've identified your bottleneck, improved bottleneck performance, ensured smooth flow into the bottleneck, and work is still piling up at the bottleneck, then it's time to add more resources.

You probably need to hire more staff. Thankfully, in Optimize you can find the data you need to make an educated decision with the correct reports. There are a few ways to forecast capacity.

Historical capacity

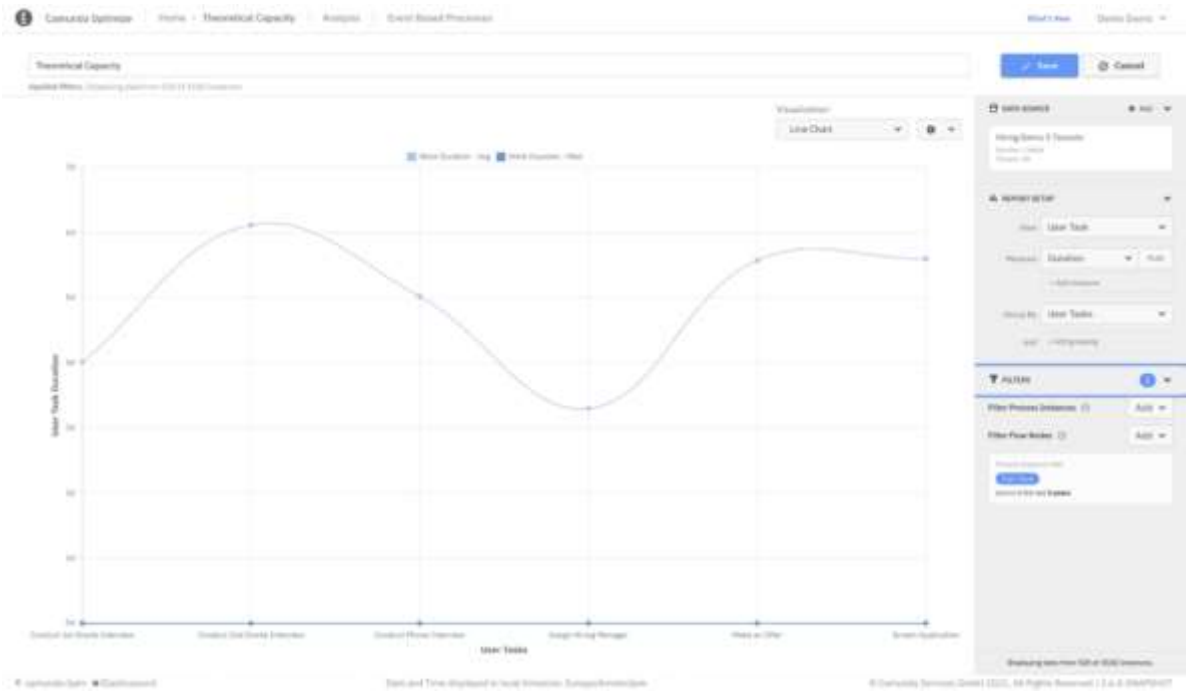
Looking at a breakdown of completed user task count by assignee and user task in September 2019, you can see approximately how many user tasks an average worker completes during a period. This can be extrapolated to see what additional headcount would provide. Of course, it may take some time for the new workers to reach maximum capacity, so keep that in mind when estimating productivity.



Theoretical capacity

You can also use task duration to calculate the theoretical capacity of your team. View the average user task work duration grouped by user tasks in a line chart, and you have a baseline for how long it takes to perform a task.

Calculating theoretical capacity is risky, though. It assumes that workers complete tasks in a sequence. For example, a worker completed task 1, then task 2 and then task 3. In addition, it assumes there are few outliers. The example below shows outliers causing a high average time and low median time.



Unlimited capacity

Of course, this wouldn’t be a Camunda blog post without a shameless plug for process automation. A sustainable long-term solution wouldn’t be to increase the staffing of a bottleneck but to find a way to automate enough of the work that it’s no longer a bottleneck.

Human workers have creativity, judgment and other soft skills that robots, explicitly programmed software or machine learning can’t replicate efficiently. Near the end of an automation journey, human workers shouldn’t have to do the same task twice.

Find a creative way to accomplish that. After all, you are a human.

Step 5: Preventing Inertia from Being the Problem

In summary, we've used a new dashboard template to visualize how work flows through the system, highlighting your bottleneck. Armed with that information, you've sliced and diced the data to identify the root cause and set up quality control on that step. Now, you will receive an alert whenever that issue appears again.

You've resolved your problem! So now you don't have a bottleneck, right? Nope.

You've shifted it somewhere else. Simply repeat this process until your process is performing as desired. Keep reviewing and updating the dashboards, and reports you created to track progress over time.