

# LOGON PERFORMANCE RESEARCH REPORT

Healthcare Edition

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What we found after studying a quarter billion  
real-world logons

## EXECUTIVE SUMMARY

Application and desktop user experience should be a topic of board-level interest, along with cyber security and compliance. It may have a direct impact on employee productivity, and even job satisfaction. When a doctor begins an appointment with a patient, both of them need to wait for the computer system to initialize before the doctor can take a look at the medical records. When this initial delay is 20 seconds, its impact is not limited to the loss of 20 seconds of the doctor's work time. It may cause the doctor to switch tasks while waiting, attend to non-productive matters, or become frustrated. It's easy to see how this can lead to providing a poorer level of patient care.

Findings reported in this paper are based on an analysis of

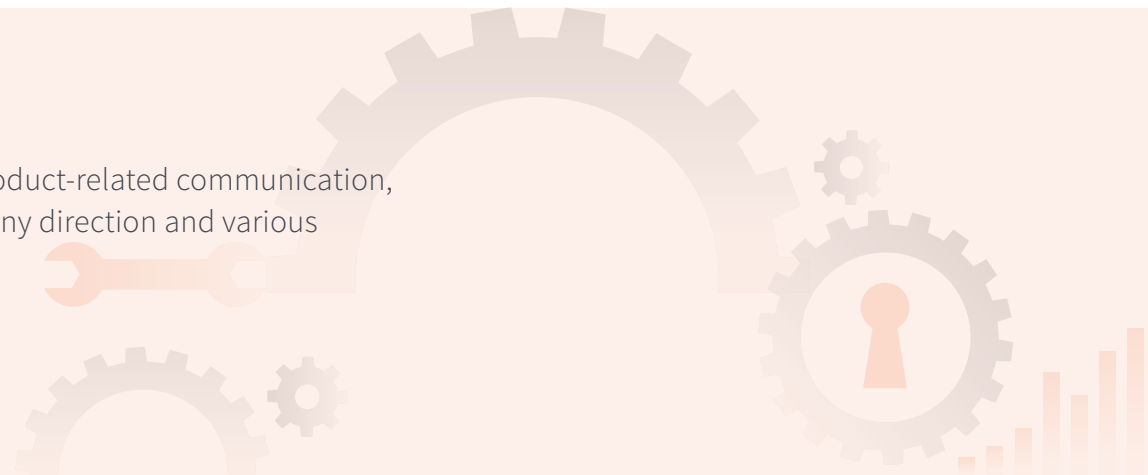
238 million individual logons in various industries. Some specific findings are focused on the healthcare industry, which provides a wide global perspective. Some of the common results and causes of slow logons are surveyed, and actionable recommendations on rectifying the situation are provided. IT executives are invited to use those findings to compare the performance in their organization to global industry-level performance and make better informed decisions about improving employee productivity.

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## INTRODUCTION

# THE IMPORTANCE OF LOGON DURATION

People who use computers have certain expectations of usability from the systems they use. Among others, acceptable speed is a key factor that determines user experience. The first and foremost reason we elected to focus on logon duration in this report is to shed light on employee productivity impairments due to the delay experienced when waiting for the application or desktop to become available.

Consider the following three workflows, which are common in the everyday reality at the workplace:

**Optimal** - user receives the application or desktop after an insignificant delay, while staying focused at the task at hand

**Acceptable** - the application or desktop appears after a noticeable delay, during which the user may attend to other tasks and lose focus

**Problematic** - the application or desktop take so long to initialize that the user decides to abandon the task and attend to something else

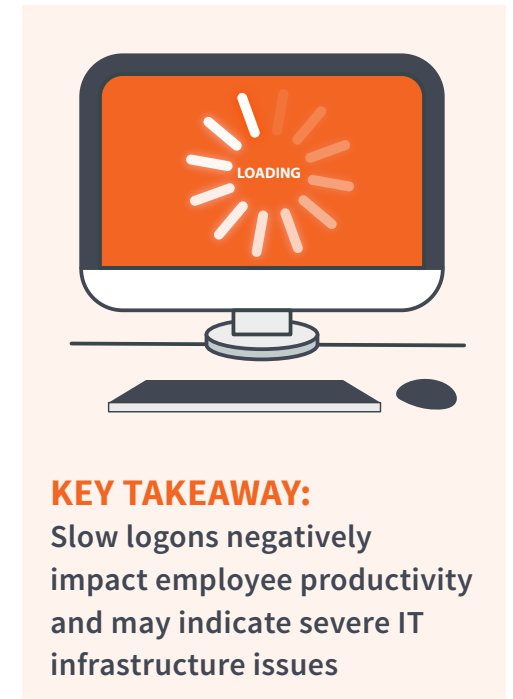
In the latter two scenarios, an additional important negative effect of slow logons is evident - the likelihood that the user will lose focus and perform the task at hand with lesser quality or forget it altogether.

There is another important reason to pay close attention to user-experienced delays such as logon duration. In enterprise IT, as systems become more complex and elaborate, various computerized services compete for a limited amount of resources (CPU, memory, network bandwidth, I/O and more).

A delay often indicates that a computer, a storage subsystem or a network device are busy processing a request. The longer the delay experienced by the user, the more severe the resource bottleneck that causes it. If the IT department is committed to analyzing user-experienced delays such as logon duration and discovering their root causes, it will become increasingly aware of inefficiencies, misconfigurations and resource shortages.

In addition to logon speed, we analyze variability of logon durations, as measured by standard deviation. Unpredictability of logon duration can sometimes have a greater negative impact on user experience than logon speed itself. The worst situation is an IT service with both high logon duration and high level of variance.

This report presents a few findings pertinent to the impact of logon duration on businesses worldwide and suggests a few implications of those findings on enterprise IT.





## OPTIMAL

1 User logs in



2 Starts Working



## ACCEPTABLE

1 User logs in



2 Waits 10-30 seconds



3 Starts Working



## PROBLEMATIC

1 User logs in



2 Waits > 30 seconds



3 Distracted and walks away



## REPORT METHODOLOGY


# DEFINING LOGON DURATION

For the purposes of this report, several definitions and assumptions will be applied regarding the measurement of logon duration. Those were kept consistent for all measurements included in the data set.

Logon duration will be defined as a period of time which begins when the user submits the credentials required in order to launch the application. From the user's perspective, this will be the moment when the Enter key is pressed or the OK button is clicked following the entry of username and password.

A Desktop Logon is an occurrence wherein after entering the credentials the user receives the full Windows desktop. The end of the login process in this case is defined as the moment when the Windows Start Menu is clickable (responsive to the user).

A Published Application Logon is defined as a logon that ends with the launch of an application which in effect replaces the default Windows shell. Any delay experienced by the user from this point should be attributed to the application itself and does not belong to the logon process proper. Therefore, a Published Application Logon delay is the period of time between the end of user authentication and the start time of the application process. This approach eliminates the variability of each application's unique performance after Windows launches it.



**KEY TAKEAWAY:**  
Logon duration is the time between entering credentials, and when the system is ready for user interaction.

## REPORT METHODOLOGY

# DEFINING LOGON DURATION (CONT.)

The difference in work patterns with regard to logons is an additional factor that needs to be considered.

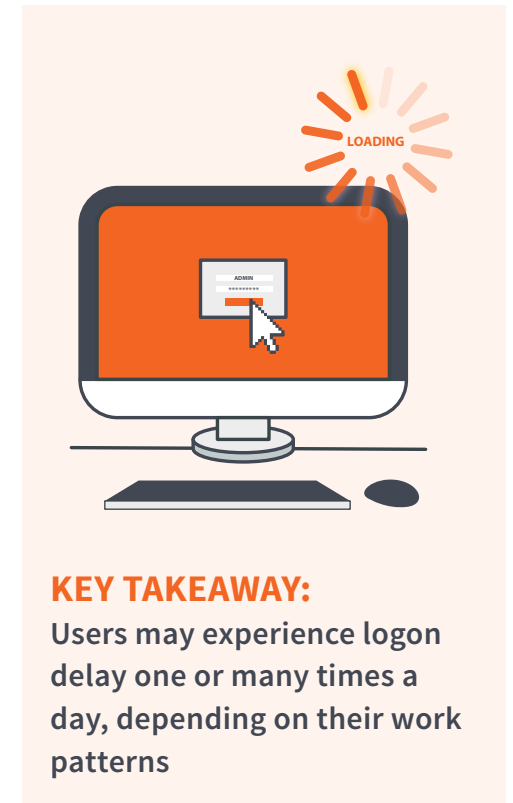
In some scenarios, users may experience the logon duration delay once a week if their session persists for the entire duration of the week and they disconnect from it at the end of every workday and reconnect the next morning. Typically, workstations and virtual desktops undergo a weekly reboot during the weekend.

In other cases, users log into their desktops daily and log off at the end of the day. In such cases, workstations are often rebooted daily.

Finally, in some cases the logon process occurs multiple times per day for any given user. Consider the case of medical personnel who roam with mobile devices between hospital

beds and from time to time require access to a medical records system in order to document patient details or measurements. In such a case a logon might occur dozens of times daily for each user.

The importance of the logon process for your business depends to a great extent on the frequency of logons in your IT environment. For this purpose, the number of daily logons was elected as a key indicator of organization size in this report.



## FINDINGS

# DESCRIBING THE DATA SET

ControlUp is an IT monitoring and management solution deployed in hundreds of organizations worldwide. For the purpose of historical analysis, benchmarking and troubleshooting, logon duration data is recorded along with other performance metrics in a global big data warehouse. The accumulated data permits us, with the consent of our customers, to publish anonymized statistics and research

findings based on large representative samples. To improve confidence in the data, we filtered out organizations for whom we did not have sufficient volume of data, ones where there were time lapses or partial data collected, and in order to prevent outliers, logon duration measurements over 1000 seconds (about 16 minutes) were also excluded from the sample.

### After filtering, this report is based on:



Logon-related information from 876 organizations



Metrics spanning roughly 20 industries. The dataset includes 132 healthcare organizations



Data from mostly the US and EMEA, where our customer base is located



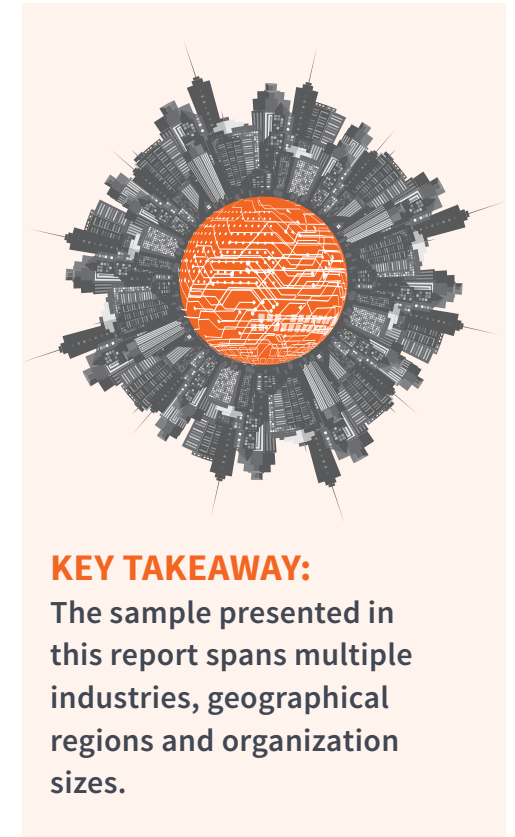
22 months of data, between early 2016 and late 2017



177 million virtual application and 61 million VDI logons



238 million logons



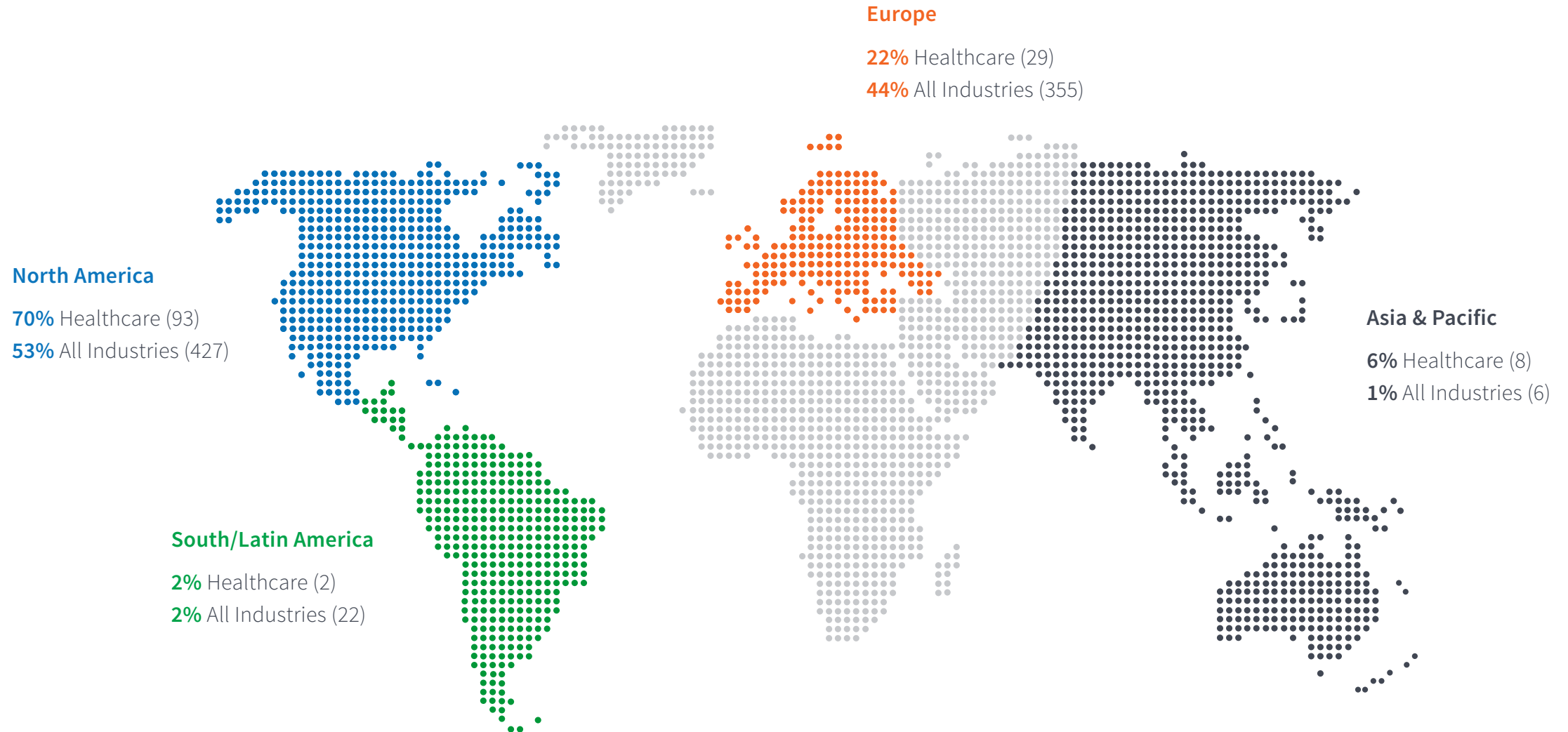
### KEY TAKEAWAY:

The sample presented in this report spans multiple industries, geographical regions and organization sizes.



## FINDINGS

# DESCRIBING THE DATA SET - GEOGRAPHY

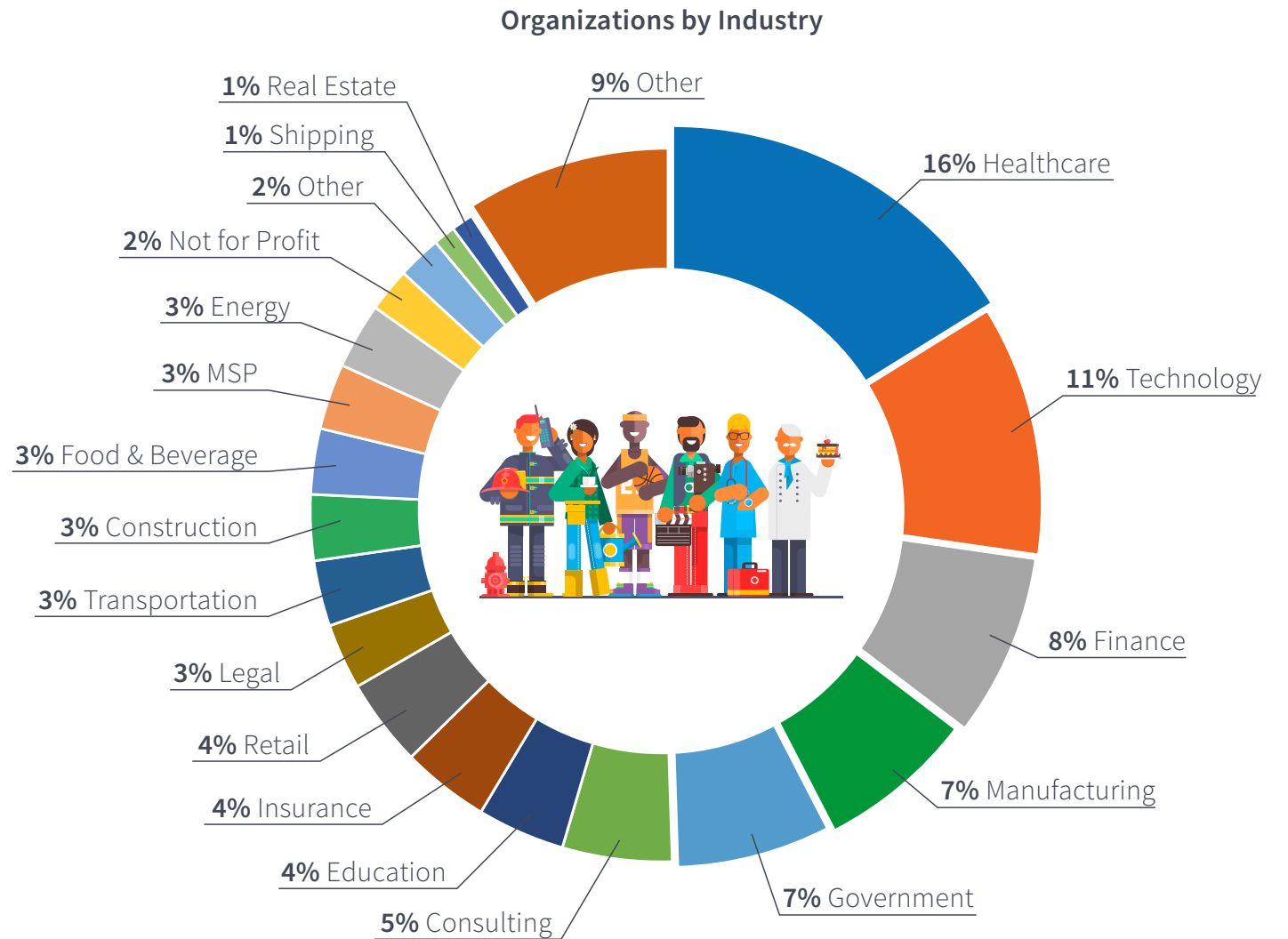


## FINDINGS

# DESCRIBING THE DATA SET - INDUSTRY

The organizations participating in the dataset were classified by industry, producing the distribution shown here.

The averages obtained in the popular industry categories will be compared to the grand average in the following section of this report.



## FINDINGS

# LOGON DURATION DISTRIBUTION - SUMMARY

Overall logon duration statistics for the entire sample:

<b>Average</b>	<b>Standard Deviation</b>	<b>Median</b>
<b>20.41</b> seconds	<b>160.26</b>	<b>14</b> seconds
<b>Count: 238,797,883 logons</b>		

The data set was then partitioned into published application logons and full desktop logons, with the following statistics:

Published Application Logons:

<b>Average</b>	<b>Standard Deviation</b>	<b>Median</b>
<b>16.44</b> seconds	<b>21.95</b>	<b>12</b> seconds
<b>Count: 177,440,487 logons</b>		

Desktop Logons:

<b>Average</b>	<b>Standard Deviation</b>	<b>Median</b>
<b>31.9</b> seconds	<b>313.49</b>	<b>23</b> seconds
<b>Count: 61,357,396 logons</b>		

Here's the distribution of logons by duration in 5 second intervals:

Duration (sec)	Desktop		Published App	
0 - 5	259,186	0.4%	4,075,587	2.3%
5 - 10	3,401,659	5.5%	62,777,544	35.4%
10 - 15	8,638,673	14.1%	40,717,585	22.9%
15 - 20	11,051,839	18.0%	27,110,780	15.3%
20 - 25	9,032,548	14.7%	15,831,325	8.9%
25 - 30	7,253,697	11.8%	8,800,003	5.0%
30 - 35	4,984,235	8.1%	5,588,995	3.1%
35 - 40	3,702,878	6.0%	3,528,138	2.0%
40 - 45	2,576,569	4.2%	2,223,855	1.3%
45 - 50	1,951,860	3.2%	1,541,121	0.9%
50 - 55	1,522,001	2.5%	1,080,329	0.6%
55 - 60	1,176,650	1.9%	780,378	0.4%
60 +	5,805,601	9.5%	3,384,847	1.9%
<b>total</b>	<b>61,357,396</b>		<b>177,440,487</b>	



### KEY TAKEAWAYS:

The average logon duration in the entire sample was 20 seconds

Half of the logons in the sample were slower than 14 seconds

Desktop logons are slower (31.9 seconds on average) than application logons (16.4 seconds on average)

## FINDINGS

# LOGON DURATION - HEALTHCARE ORGANIZATIONS

An organizational logon duration average was computed in order to provide a summary measure of the delay experienced by users in different organizations.

The organizational averages ranged between 3.38 seconds and 76.7 (!) seconds. To reiterate, an organizational average of 76 seconds indicates that users in one of the sampled organizations experienced an average delay of more than a minute. When this is the organizational average, many logon delays will actually be above that, which exemplifies a disastrously slow user experience.

Overall logon duration per organization:

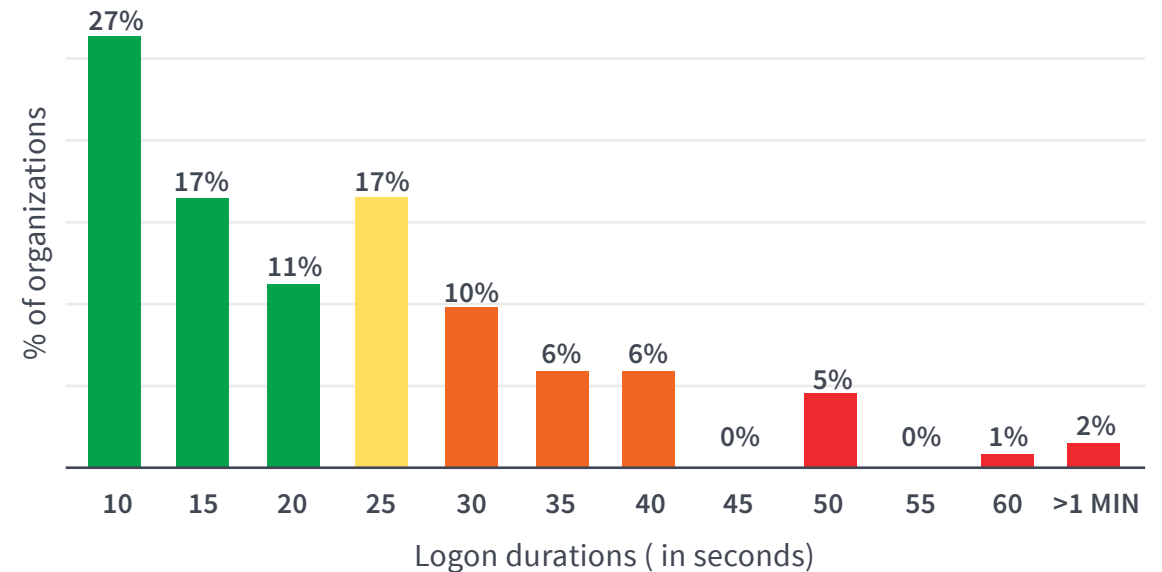
Average	Standard Deviation	Median
20.37 seconds	13.39	16.23 seconds
Count: 132 organizations		

The chart on the right demonstrates the distribution of organizational averages by 5-second ranges. This distribution is easy to use in order to determine where is a given organizational average situated when compared to the global dataset.

## LOGON DURATION

control UP Insights

Statistics obtained in October 2017 from a global dataset of ControlUp Insights users  
Dataset includes 87 million logins in 132 organizations worldwide



### KEY TAKEAWAY:

Users in 1 out of 5 healthcare organizations experience an average logon speed of 30 seconds or more.

## FINDINGS

# LOGON DURATION - ALL INDUSTRIES

Overall industry averages ranged between 3.38 seconds and 226 seconds. To reiterate, an organizational average of 226 seconds indicates that users in one of the sampled organizations experienced an average delay of almost 4 minutes. When this is the organizational average, many logon delays will actually be above that, which exemplifies a disastrously slow user experience.

Overall logon duration per organization:

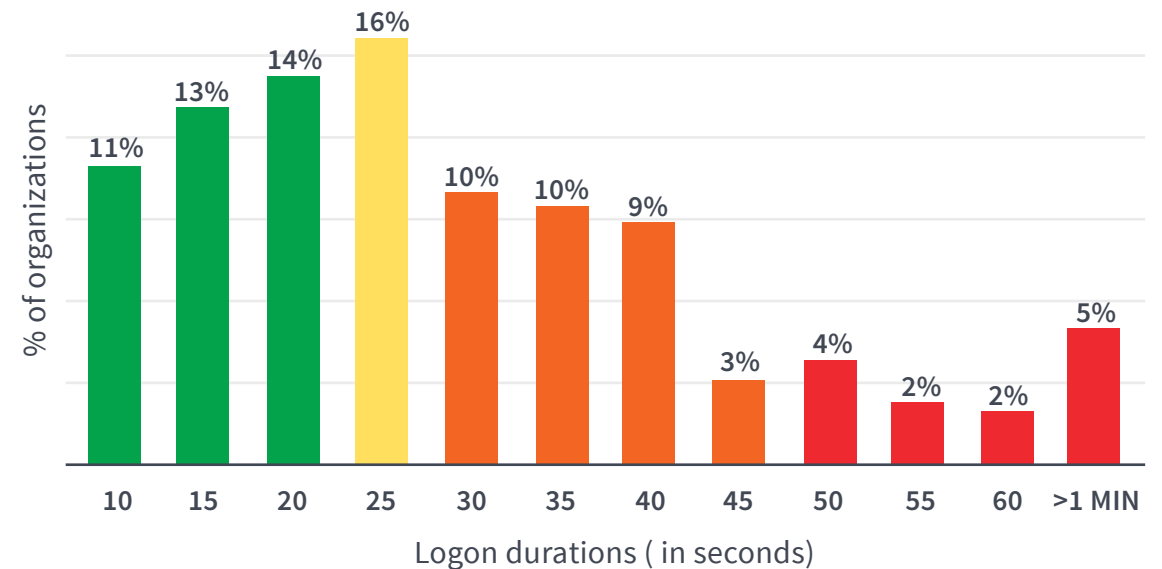
<b>Average</b> <b>27.81</b> seconds	<b>Standard deviation</b> <b>19.52</b>	<b>Median</b> <b>23.52</b> seconds
<b>Count: 876 organizations</b>		

The chart on the right demonstrates the distribution of organizational averages by 5-second ranges. This distribution is easy to use in order to determine where is a given organizational average situated when compared to the global dataset.

## LOGON DURATION

control UP Insights

Statistics obtained in October 2017 from a global dataset of ControlUp Insights users  
Dataset includes 238 million logins in 876 organizations worldwide



### KEY TAKEAWAY:

Users in 1 out of 3 organizations in general experience an average logon speed of 30 seconds or more

## FINDINGS

# LOGON DURATION - ORGANIZATIONAL AVERAGES AND STANDARD DEVIATION

When considering user experience, average measures provide a convenient anchor point for comparing groups and establishing baselines. However, the average does not indicate how consistent the measurements are. Hence, another important parameter to consider is the standard deviation, which indicates the degree of variability of the logon delays within each organization. Just like with the organizational average, a lower standard deviation is better because it indicates a more consistent user experience.

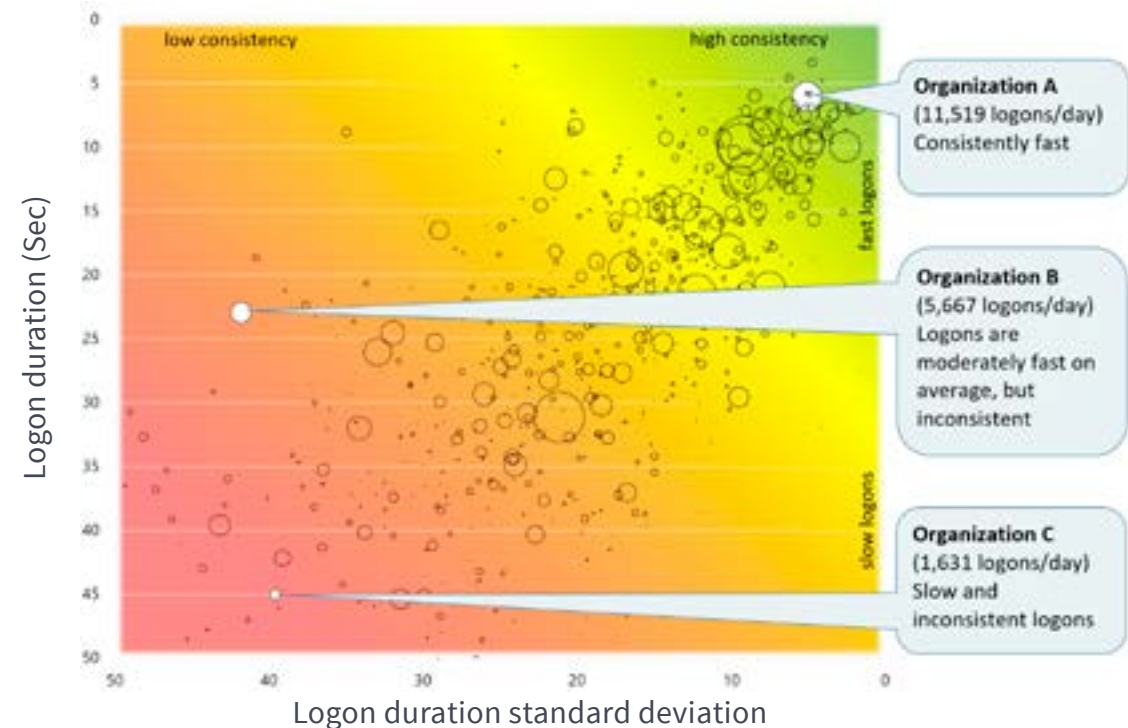
The following chart depicts the distribution of organizations in the sample according to their organizational logon duration average (Y axis), their organizational standard deviation (X axis) and the number of logons performed daily (bubble size).

The bubbles situated on the left edge of this chart represent organizations in which logon duration is highly variable and is therefore less consistent in terms of user experience, when compared to organizations represented by bubbles on the right edge of the chart.

For example, Organization B on the chart has an average logon duration of 23 seconds which may be below average, but with a very high standard deviation of 42. This suggests that among the 5,667 logons performed in this organization daily, there is a high degree of variability in the delays experienced by users.

## DURATION AND CONSISTENCY OF THE LOGON PROCESS

(Org averages, bubble size = avg daily login count)



### KEY TAKEAWAY:

From the user's perspective, a highly variable logon speed is disruptive because it represents an inconsistent user experience.

## FINDINGS

# LOGON DURATION - ORGANIZATIONAL AVERAGES AND STANDARD DEVIATION BY INDUSTRY

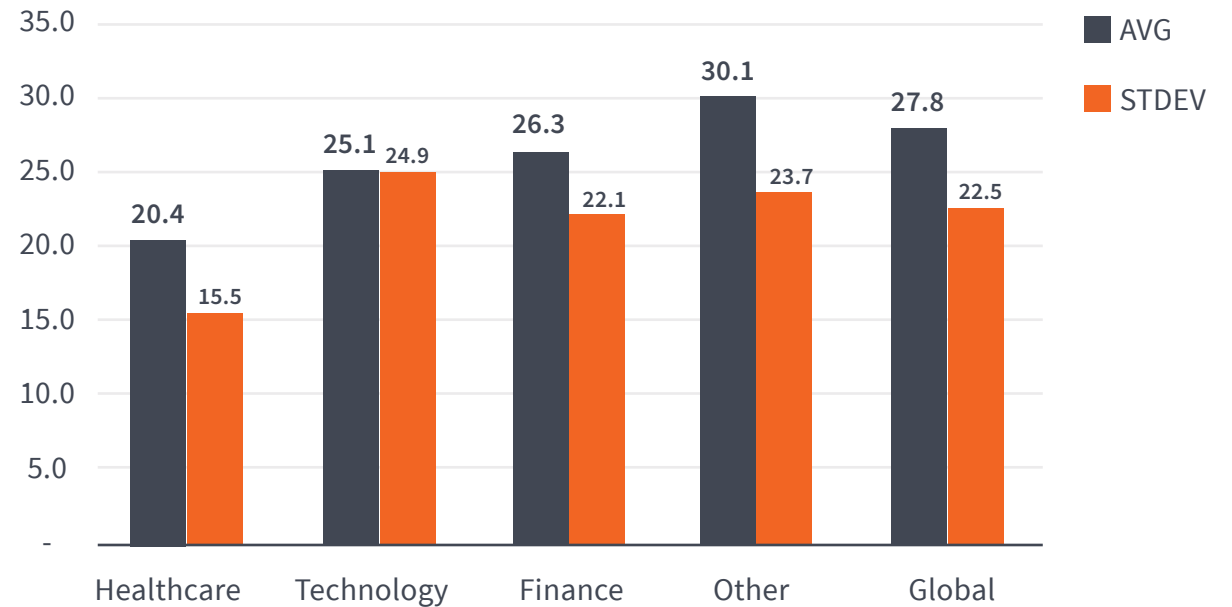
The healthcare industry was represented in the sample by 132 organizations. The average of organizational averages for those organizations was 20.4 seconds with an average standard deviation of 15.5 seconds.

The technology industry was represented by 132 organizations. The average of organizational averages for those organizations was 25.1 seconds with an average standard deviation of 24.9 seconds.

The finance industry was represented by 63 organizations. The average of organizational averages for those organizations was 26.3 seconds with an average standard deviation of 22.1 seconds.

The averages above are provided in order to offer readers a relevant frame of reference. For a healthcare environment, it may make more sense to compare the average to other healthcare organizations.

**LOGON DURATION  
ORGANIZATIONAL AVG AND STDEV BY INDUSTRY**



## DISCUSSION

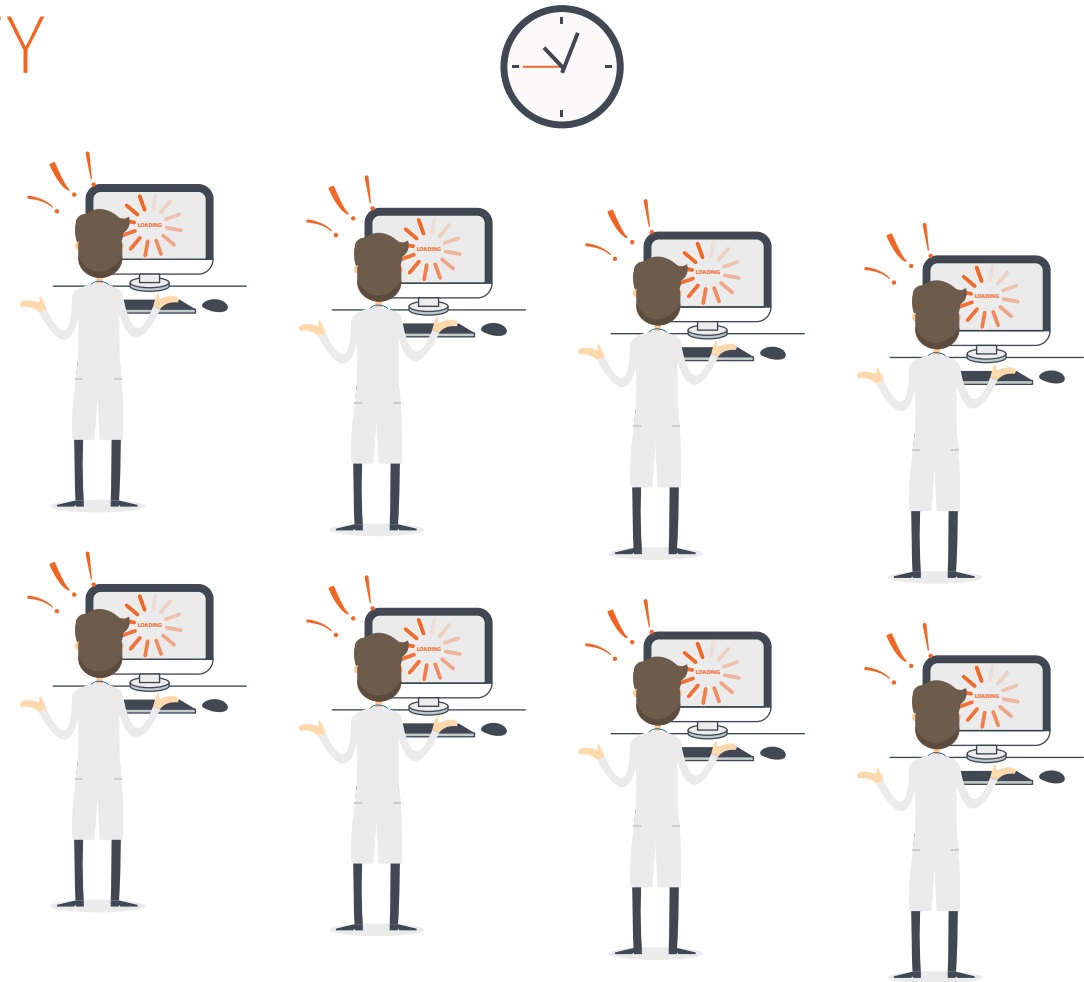
# IMPLICATIONS OF LOGON DELAY FOR EMPLOYEE PRODUCTIVITY

One way to interpret logon duration from the user's standpoint is to consider the waiting time associated with the delay. If we assume that during this waiting time the user is idle and not occupied by other work-related activities, the impact of logon duration on employee productivity can be quantified in terms of work hours that either wasted completely or spent in a suboptimal way.

Consider an extreme, but real example from the dataset, which involves an organization in which 5,822 logons are performed daily by 1,676 users and the average logon duration is 71.76 seconds. In a yearly perspective, an employee of this organization spends an average total of 18 working hours waiting for the desktop or application to become available.

In terms of realistic improvement goals, if the organization in the example above could improve the IT infrastructure so that the logon duration is down to the global organizational average of 27.8 seconds, it could prevent a waste of 11 working hours per year for each employee, or a total of 18,553 working hours for the entire organization per year.

In this dataset, an average total time spent on logon delays by an organization is 1,434 hours (159 working days at 9 hours per day) per year.



### KEY TAKEAWAY:

Delays associated with logon duration may result in a waste of employee work hours. Even a minor improvement in logon times may offer significant savings on the organizational level.



## DISCUSSION

# COMMON ROOT CAUSES OF SLOW LOGONS

Investigating root causes for slow logons can be a complex process which involves procedures, tools and methodologies that are beyond the scope of this report. However, we would like to provide a brief account of several common issues associated with slow logons, and some general directions for resolving them.

### User profile size

The number and size of files contained in the user profile may cause unwanted delays when loading the user profile. It is recommended to perform periodic surveys of the profile sizes, aiming to identify work patterns that cause large amounts of data to accumulate in the user profile.

Folder redirection and profile management solutions may provide a means to minimize the impact of oversized profiles. Additional relief may be provided by deleting temporary files or cleaning up directories which hold no mission-critical content.

### Resource contention

If your findings indicate that logon delays are particularly high during peak times (such as morning logon storms), the reasons may point to resource bottlenecks. Insufficiently allocated resources, such as network bandwidth, storage throughput or compute cycles may all cause slow logons.

The recommendation in such cases may be as simple as allocating more hardware resources, or much more complex - such as in cases where significant bursts of simultaneous activity require a redesign of the infrastructure or its components.

### User environment misconfigurations

In dynamic and complex IT environments configuration changes happen frequently and may cause unwanted effects in unexpected parts of the infrastructure. A classic example of such a change is a relocation or migration of storage arrays or network drives. Attempting to map a user home directory or a network drive to a network location which is no longer accessible is a common cause of slowness experienced during logon.

It is therefore recommended to review logon scripts, Group Policy objects and other user environment configurations in order to eliminate references to irrelevant or outdated file system locations.

While many other root causes of high logon duration have been identified, the issues mentioned above seem to be common to many different IT environments, affecting organizations of all industries and sizes. With a carefully planned priority-based approach, those issues can be addressed in a manner that will save resources and increase productivity and efficiency in your organization.



### KEY TAKEAWAY:

**Slow logons have several potential causes, all of which can and should be addressed in order to increase efficiency**

## RECOMMENDATION

# HOW TO START MONITORING LOGON DURATION?

The main objective of this report is to provide real-world findings regarding the delays associated with logon processes and their impact on organizations worldwide. Hopefully, the findings have inspired you to take an interest in the logon duration state in your organization. Here is a basic framework for assessing your organization's logon duration using a step-by-step approach.

### Step 1 - Ask Around

To make a preliminary assessment of logon duration you can perform some easy tests, such as asking your users whether they have experienced slowness during the logon process. The answers may vary and are subject to bias due to differences in subjective definition of slowness. However, if even a small fraction of your surveyed users answers affirmatively, you should consider deeper research. Another important question relates to the impact of logon delays for your users, or in other words - "how much does the logon delay damage the day-to-day productivity?" The answer to this question may depend on the organizational role of the respondent. As an IT decision maker, you may want to utilize the different answers in order to focus on a subgroup of employees for which the impact of delays is the highest.

### Step 2 - Define Slow

For this step, we suggest using the most basic measurement equipment for assessing user experience - the stop watch. By measuring manually how long your logon process lasts and comparing different measurements obtained at different times and in

different environments you can define what "slow" and "fast" means in your environment. By establishing your own subjective boundary between acceptable delays and unacceptable ones, you make an important step towards improvement. Now it's time to expand your dataset.

### Step 3 - Go Pro

ControlUp's capabilities for monitoring logon duration have a proven track record in the industry. While various measurement tools exist that can provide a logon delay measurement, ControlUp provides an easy and accurate way to obtain user experience metrics which have a high correlation with delays measured from the user's perspective. After some exploratory testing, it's time to start measuring logon duration continuously, while aiming to provide full coverage for the target user audience. If your organization has typical seasonal work patterns, it may make sense to monitor logon duration continuously for at least a month in order to obtain a sample that represents variations in the logon delays over time.

### Step 4 - Start from the Extreme

Once you have obtained some measurements and analyzed them by means of a historical reporting solution such as ControlUp Insights, you can start investigating the findings. If you focus on the most extreme results such as logons that last for long minutes (and you are bound to have some, given a large enough sample), you are likely to discover gross misconfigurations or resource shortages which you can address easily.



**KEY TAKEAWAY:**  
You should consider measuring logon duration in your organization

# CONTACT US

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We can help you measure, monitor and maximize logon performance, and optimize resource utilization.

It literally takes 15-minutes to install ControlUp in your environment.

or