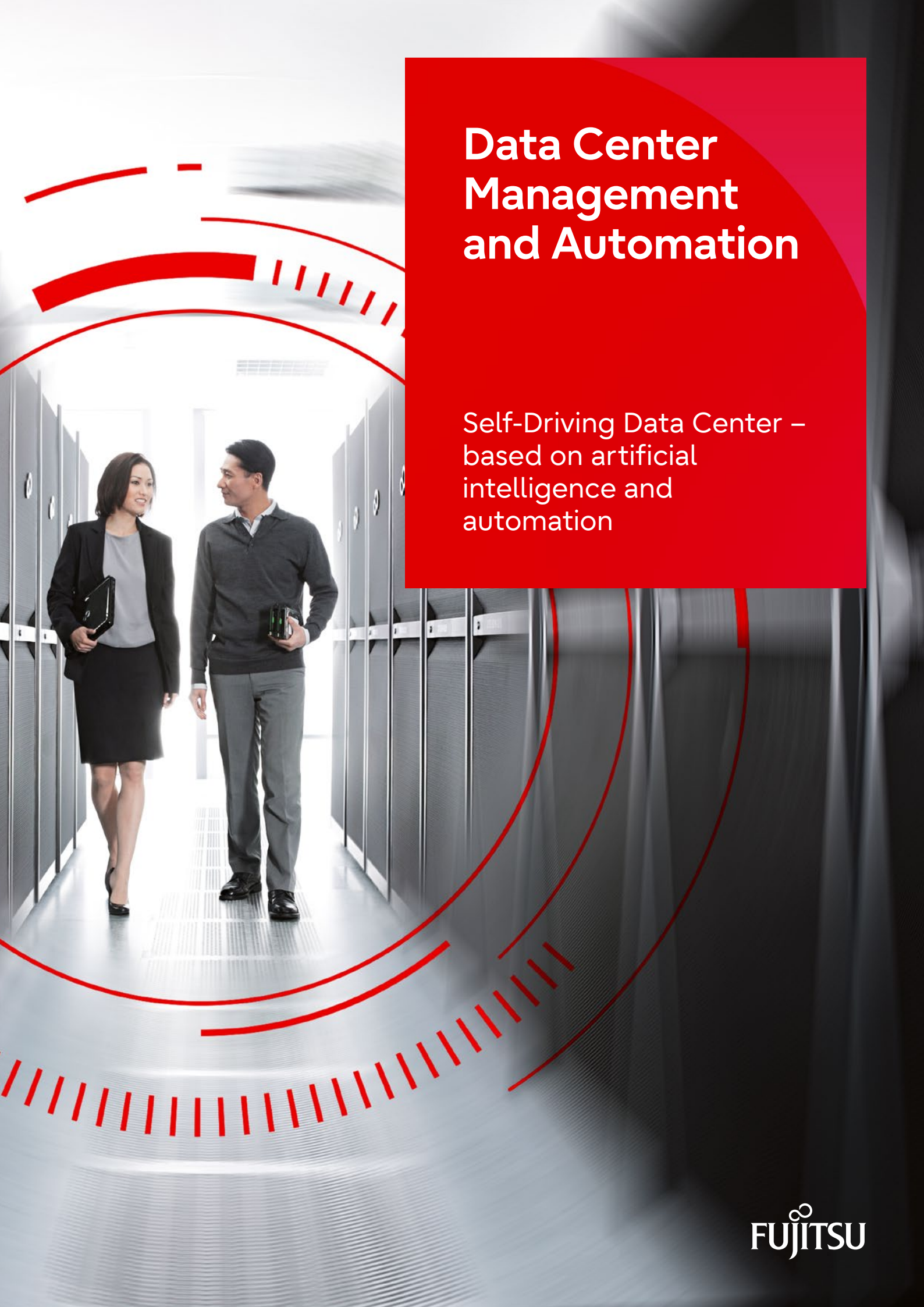
Data Center Management and Automation

Self-Driving Data Center – based on artificial intelligence and automation



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Today new and innovative solutions are being adopted faster than ever before. Industry 4.0, pattern recognition in conjunction with automation, and self-driving cars are just a few examples of digital developments which – until recently – seemed to be more like science fiction rather than feasible concepts. At the same time, most enterprises are coping with the challenges of digital transformation in their data centers, which function as the very backbone of their business. These developments are putting IT teams under extreme pressure as they strive to prevent outages and keep operations running flexibly, smoothly and efficiently. But how can stressed IT departments keep up with constantly growing demands while still keeping operations under their control? The application of artificial intelligence (AI) and intelligent automation is the answer.

Structured data center environments are ideal for automation. As infrastructures become more complex, the implementation of "traditional" automation alone is not enough when it comes to managing data centers with speed, agility and a business-centric approach. AI is the next logical step toward transforming the data center into an intelligent "nerve center" in a digital world. However, the intelligent automation of data center operations can be something of a challenge and requires a holistic concept, trust and agility right from the start. Fujitsu advises and supports customers as they move forward by providing them with tailor-made Data Center Management and Automation (DCMA) solutions.

Using artificial intelligence to find problems before they occur

Much like a self-driving car, the Self-Driving Data Center is so autonomous that very little or no human intervention is needed. Using big data and machine learning, huge volumes of data are gathered from diverse IT operation tools and devices in real time – this information serves as the input for AI technology. AI components use this data to learn how data centers function under normal circumstances, and then dynamic threshold values are defined as a function of time. Whenever deviations from the defined threshold values occur, alerts are issued and self-healing reactions (based on alert patterns) are initiated – this process is completely automatic, or may entail some degree of administrator intervention. Gartner Group analysts have named this approach AIOps (Artificial Intelligence for IT Operations).

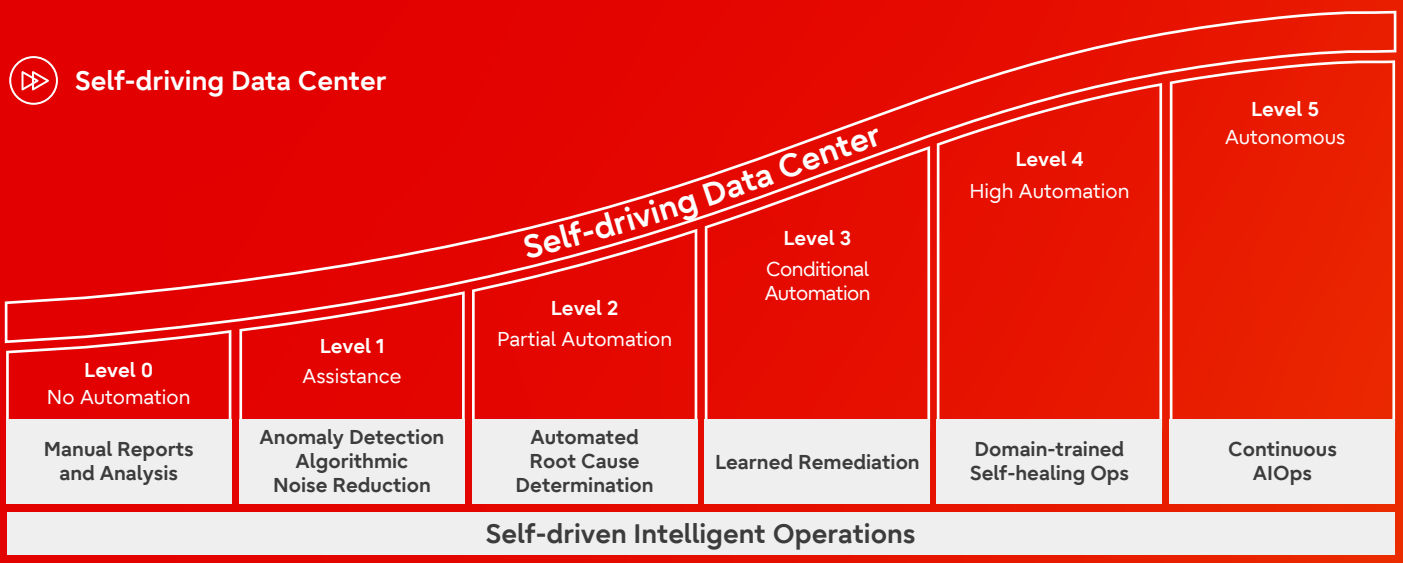
The Self-Driving Data Center concept is essential for implementing predictive maintenance in the data center. Sensors constantly track status information and key parameters (such as temperature, workload capacity, energy requirements) about the data center and its IT components – servers, storage, network, operating system, middleware, applications, IT services, etc. This AI-based analysis and alerting data helps administrators discover complex problems before they actually occur. IT teams can initiate self-healing measures at an early stage to ensure that IT operations run smoothly – the teams also save valuable time which can be used for other important tasks.

Today AI already provides detailed information about various systems that are running in complex digital environments. Knowing these details is a great advantage when it comes to the smooth, flexible and efficient provisioning of IT services:

- **Proactive management** is much simpler because alert patterns help identify potential issues at early stages and with great precision.
- **Higher productivity** thanks to:
  - Gathering of data relevant to overall IT service delivery.
  - Recognition of the relevance of alert patterns.
  - Precise root cause diagnosis.
  - Error prevention through early intervention.
- **More efficient collaboration** across IT teams and departments because data from various sources is collated, analyzed and visualized.
- **More efficient IT operations** temming from the combination of AI and automation.

The Self-Driving Data Center – constant further development

AI is both a challenge and an opportunity for IT departments. This technology has enormous potential. Furthermore, it is not limited to achieving one specific goal only. Instead, the overall purpose is to leverage the new and innovative benefits of AI in ways that will make IT operations more resilient, flexible and efficient. The individual steps of development are very similar to those applied to technologies for self-driving cars.



Source of the graphic: CA Technologies a Broadcom Company

Boosting efficiency with artificial intelligence and automation

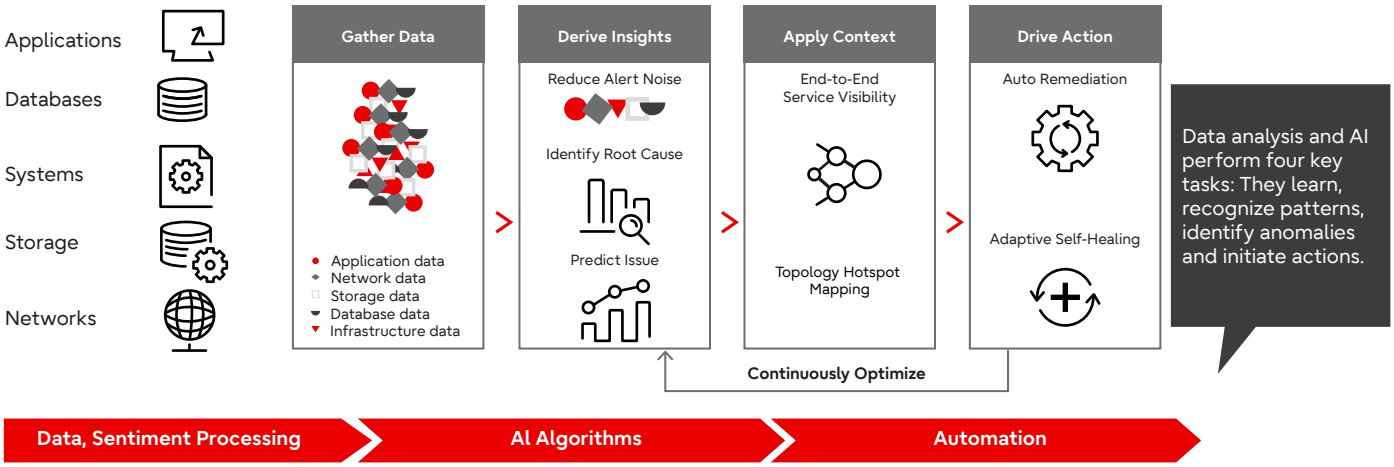
Problems that arise in IT systems and software installed in the Self-Driving Data Center are corrected according to predefined processes that are autonomous, fully automated or partially automated. The learning system lets IT teams proactively manage IT operations. Monitoring IT environments results in fewer false alarms, and administrators can find problems and their causes much faster – even before they can have any impact on operations.

For example: Quite often data centers rely on standardized static threshold values which lead to many unnecessary alarms – because they cannot recognize cyclical deviations, among other things. A server used for business reporting has very high CPU loads at the end of the month. This is quite normal. By contrast, extremely high workloads on a web server would indicate that some kind of intervention is necessary. Thus it is better to rely on margins that take volatility over the course of time into account. Today various kinds of data can be used to do this, for example, the number of users who are causing the current CPU workload. This example could also be approached in reverse, i.e. the learning system would be able to determine when a very low level of system utilization is considered the norm.

Data analysis and AI perform four key tasks: They learn, recognize patterns, identify anomalies and initiate actions.

- Constant data analyses support the learning process so that the normal status can be recognized. The threshold values determined from ongoing analyses are then mapped as a function of time.
- When it comes to pattern recognition, historical data (abnormal threshold values, groups of alerts, metrics, etc.) and real-time data are analyzed – and along with known patterns they help to identify or predict future events.
- The detection of anomalies helps reveal discrepancies from normal system behavior at an early stage.
- When anomalies are apparent, AI acts as a trigger which launches autonomous or semiautomatic self-healing processes.

Artificial intelligence – Fujitsu has been conducting research and development in this area for more than 30 years and has received more than 200 patents of relevance to AI. Fujitsu has gathered this comprehensive know-how in AI tools and technologies to form what is known as Zinrai, the knowledge and technology framework for AI innovation from Fujitsu. The Zinrai platform includes tools for image recognition, natural voice processing and prognoses – as well as the world's first technology for explaining the logic behind new insights. This is of fundamental importance, especially in areas where decisions are subject to verification. Depending on the business challenges facing its customers, the Zinrai platform from Fujitsu also offers specific AI tools from IT partners.



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Fujitsu experience – your benefit

In our role as your trusted partner, we provide Data Center Management and Automation (DCMA) for the innovative further development of your data center processes – we also advise you and offer holistic services, products and solutions along the way.

Fujitsu has many years of experience in the management and automation of large data centers. Based on this expertise we have developed the innovative DCMA solution suite which is setting market standards.

DCMA is based on a Fujitsu reference architecture that includes infrastructure management as well as operational processes. This lets customers shape and strengthen their data centers so that they can handle digital and interwoven business processes. The gradual implementation of AI results in improved operational efficiency, in addition to cutting costs and boosting the flexibility of your IT team.

Ready to learn more about our DCMA portfolio and the use of AI for IT operational processes?
We would be happy to advise you personally:

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