Список литературы

1. Теоретическая инноватика: учебник и практикум для бакалавриата и магистратуры / Под ред. И.А. Брусаковой. М.: Изд-во Юрайт, 2017. 333 с.

2. Брусакова И.А. и др. Исследование тенденций развития информационного менеджмента в современных условиях. СПб.: Изд-во СПб университета управления и экономики, 2014. 138 с.

3. Heiss Franz Josef. SAP Net Weaver Web Application Server. Munchen: Addison-Wesley, 2005.

4. Mayerhoter R. Einstieg in SAP Business One. Bonn, 2005.

5. Интернет портал «Корпорации SAP». URL: http://www.sap.com (дата обращения: 05.05.2020).

УДК 330 : 338 : 502.6 : 654
doi:10.18720/SPBPU/2/id20-204

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ПОДКЛЮЧЕНИЕ СИСТЕМЫ УПРАВЛЕНИЯ ПРОИЗВОДСТВОМ (MES) К ERP-СИСТЕМЕ

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Аннотация. С 1970-х годов интеграция информационных технологий с точки зрения бизнес-процессов, связанных с деятельностью компаний, продолжала расти. Первоначальнобольшинствоиндивидуальныхрешений для различных отраслей были реализованы для того, чтобы отразить менее стандартизированные бизнес-процессы. В результате все более равномерного проектирования бизнес-процессов программные системы также могут быть стандартизированы. Это стало началом общедеративных бизнес-приложений, которые теперь известны как системы планирования ресурсов предприятия (ERP) [1]. Основное внимание уделяется управлению и планированию бизнес-процессов, включающих следующие субъекты: материалы, ИКТ, капитал, персонал. В дополнение к бизнес-процессам, процесс создания стоимости занимает значительную часть мировой ERP-системы [2]. ERP системы, созданные на рынке, сегодня являются системами SAP, Infor, Oracle или Microsoft. Эти «глобальные игроки» (компании с глобальным воздействием [3]) разделяют более 60 % рынка с их ERP-приложениями. На SAP приходится более 20 % этого объёма, что делает её одним из крупнейших поставщиков [4, 5]. В

2014 году SAP был крупнейшим и на международном уровне четвертым по величине производителем программного обеспечения на европейском рынке [6]. Становится ясно, насколько важны ERP-системы во всём мире. Базовый проект подготовлен на основании методологии, разработанной в Технической высшей школе Розенхайма с использованием программных средств ФОМ Высшей школы Мюнхена.

Ключевые слова: ERP-системы, ERP-приложения, бизнес-процесс, общедеративные бизнес-приложения, системы управления производством, MES.

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CONNECTION OF A MANUFACTURING MANAGEMENT SYSTEM (MES) TO AN ERP SYSTEM

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Abstract. From the 1970s, the integration of information technologies regarding company-specific business processes continued to increase. Initially, most individual solutions were implemented for various branches of different companies in order to map the less standardized business processes. As a result of the increasingly uniform design of business processes, the software systems could also be standardized. This was the beginning of generally valid business applications, which are now known as ERP (Enterprise Resource Planning) systems [1].

The focus is on the control and planning of business processes that include the following entities: material, ICT, capital, personnel. In addition to the business processes, the process of adding value takes up a significant part of the ERP system world [2]. Today's established ERP systems are built from companies like SAP, Infor, Oracle or Microsoft. These "global players" (companies with a global sphere of activity [3]) share over 60% of the market with their ERP applications. SAP has a share of over 20% and is one of the largest providers [4, 5]. In 2014, SAP was the largest and internationally the fourth largest software company on the European market [6]. The immense importance of ERP systems worldwide can be seen. The underlying project is based on the methodology developed at the Rosenheim Technical University of Applied Science using software developed and provided at the FOM Munich University of Applied Science.

Keywords: ERP-systems, ERP-applications, business process, general business applications, production management systems, MES.

Introduction

The question of the scientific work was what interfaces between systems in industry could look like and how the interfaces could be implemented.

In the practical part of the work, an artifact was designed and build to show what an interface between an ERP and MES (Manufacturing Execution System) could look like. A piece of software was implemented that runs through the entire cycle from the request to the ERP system to the visualization of the response on the MES side. The user has the option of using a "DateTimePicker" to set a date value from which the orders should be picked up from the SAP ERP system.In addition, the user has the option of filtering the returned list according to specially defined criteria.

Furthermore, the effects of the 4th industrial revolution on the automation pyramid are being examined and what influence this has on the management level and ERP systems: Not all industrial processes will change immediately with the industrial revolution.

Materials and Methods

So, the ERP systems will continue to take its place in automation. The central ERP components such as finance and human resources or the transparency of global processes and their orchestration across locations will continue to be an integral part of companies.

The dissolution of the one-dimensional and rigid levels of the automation pyramid to reference models, such as that of RAMI 4.0, does not mean that systems such as ERP and MES become superfluous, but that these systems are seamlessly linked with each other via their interfaces. No full stop [3, 8]. The artefact of the design science research methodology could confirm this assumption and demonstrate how the implementation of the interface looks like.

The development of the problem described at the beginning is based on the following: At the beginning, the basics of the levels of the reference model of the automation pyramid are analyzed. The focus is on the business process and manufacturing level. A further step deals with the development of automation in the course of the fourth industrial revolution. The artifact of the design science research approach shows what an interface implementation between the described levels can look like. Here, the REST paradigm of interface implementation is discussed in more detail. The REST paradigm represents the framework of communication between the ERP and the manufacturing management system. The communication is consequently carried out via web services.

The focus of the work is on the practical part of the interface implementation to derive generally applicable principles of interface implementation between prevailing industrial systems from its implementation. Subsequently, this scientific work is aimed at scientists and practitioners in the fields of business, industry, ERP, MES, automation and computer science [7].

ERP and MES systems can be found in the most common cases in manufacturing companies. This system structure has been describing automated production for some time ("The automation pyramid"). In practice, the systems are often still linked to one another via a paper flow. One of the goals of the fourth industrial revolution is to establish paperless production. This goal makes an information technology interface, via which data can be automatically transferred, indispensable (see Reference [8]). In concrete terms, the application lets you describe it as follows: The sales department of a manufacturing company accepts customer orders and maintains them in the higher-level SAP ERP system. A sales order can consist of several items that represent the order of different articles. Depending on the industry, additional information such as quantity, material, production location, priority etc. is stored here. An extract of this information is necessary to produce these articles and for the timely fulfillment of the customer order. An application in the context of the MES is to be implemented, which automatically queries this information from the ERP system and visualizes it in the production environment. In this way, key figures such as "time-to-market" and the potential for errors in order transmission without paper can be optimized.

Results and Discussion

An MES module is implemented, which picks up orders from the SAP ERP system based on time stamps. The application logic runs as follows (see Fig. 1):

1. The application is started, a REST request for the ERP system with today's time stamp is generated.

2. The request is sent to the ERP system.

3. After successful authentication on the ERP system, it replies with the orders (including all positions within the order) created since the configured timestamp.

4. The MES system processes the answer and displays the orders in a suitable form.

5. The user can again adjust the time stamp to display the desired orders.

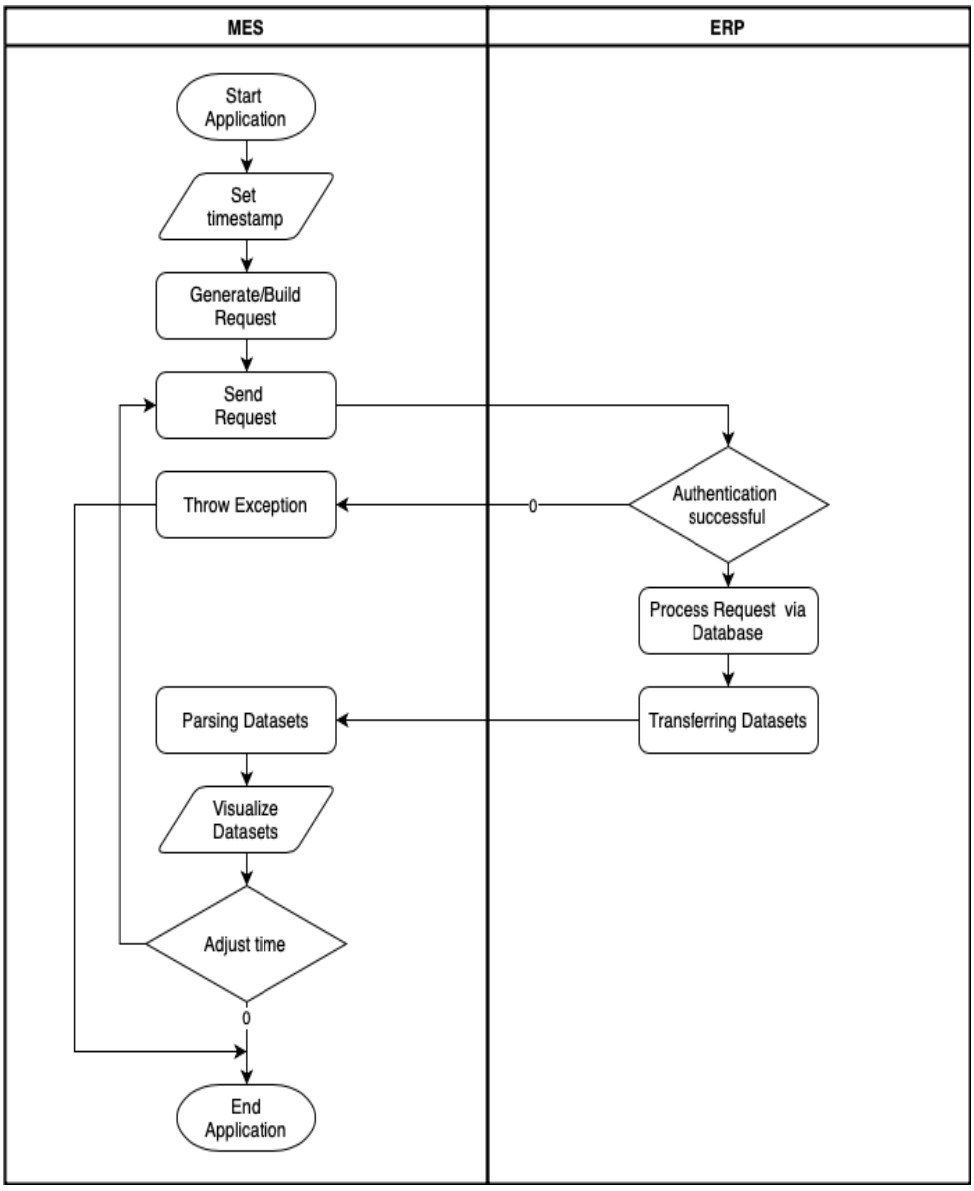

Fig. 1. UML flow chart

Conclusion

Traditional systems such as ERP and MES are expanded to include applications that map Industry 4.0 functionalities. Industry 4.0 places the requirement of data exchange across company boundaries and locations. The applications and extensions that are implemented in this context enable a real time and cross-departmental flow of information along the entire product life cycle [9].

In future, systems will be required that have easy-to-implement and expandable interfaces. The addressed REST paradigm could stand out here.

In addition, standards, uniform interfaces, cross-production protocols and data formats will be necessary in order to address the large number of devices and systems in a simple and transparent manner. A reference architecture, such as RAMI 4.0, will be of immense importance in order to be able to functionally control companies in the fourth industrial revolution [9].

References

1. Leiting A. Einführung von ERP-Systemen // Unternehmensziel ERP-Einführung. IT muss Nutzen stiften. Springer Fachmedien Wiesbaden, 2012. VII. P. 83–195. DOI: 10.1007/978-3-8349-4462-7_4.

2. Ebel B. Produktionswirtschaft. Verlag: Kiehl Friedrich Verlag G, 2009. 204 p. ISBN 10: 347070449X / ISBN 13: 9783470704494.

3. Cf. URL: https://www.duden.de/suchen/dudenonline/global%20player (access date: 22.05.2020).

4. Cf. URL: https://www.finance-magazin.de/finanzabteilung/controlling/sap-oracle-microsoft-welchererp-anbieter-ist-der-beste-1393901/ (access date: 22.05.2020).

5. Cf. URL: https://www.computerwoche.de/a/kampf-der-erp-titanen, 3223108 (access date: 22.05.2020).

6. Global 100 Software Leaders by revenue // IDC (Data, ranking, oftware 100, customized sort), 2014. URL: https://www.pwc.com/gx/en/industries/technology/publications/global-100-software-leaders/explorethe-data.html (access date: 22.05.2020).

7. Brocke J. vom, Simons A., Niehaves B., Riemer K., Plattfaut R., Cleven A. Reconstructing the giant: On the im- portance of rigour in documenting the literature search process // Proc. of the 17th European Conference on Information Systems (ECIS 2009), Verona, Italy, 2009. Vol. 9 (2009). P. 2206–2217.

8. Eine Zukunft ohne Papier // GmbH, TeDo Verlag (MES, ERP, SCM, PPS, CRM, BPM, PLM, Stellenmarkt, Management, System), 2014. URL: https://www.it-production.com/allgemein/fertigungsprozesseeinezukunft-ohne-papier (access date: 22.05.2020).

9. Vogel-Heuser B., Bauernhansl T., Hompel, M. Handbuch Industrie 4.0 Bd.4: Allgemeine Grundlagen. Wiesbaden: Springer Berlin Heidelberg, 2017. P. 574., P. 587. DOI: 10.1007/978-3-662-53254-6.

УДК 681.322.067
doi:10.18720/SPBPU/2/id20-205

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РЕАЛИЗАЦИЯ ЗАЩИЩЁННОСТИ КЛАССА 1Б В АВТОМАТИЗИРОВАННЫХ СИСТЕМАХ СПЕЦИАЛЬНОГО НАЗНАЧЕНИЯ ПОД УПРАВЛЕНИЕМ UNIX — ПОДОБНЫХ ОПЕРАЦИОННЫХ СИСТЕМ

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