# Introduction

With today’s society being increasingly data driven, the related tools and technologies also gain importance (Levin and Mamlok 2021). Consequently, over the last years, big data has turned into one of the most influential trends (Ghasemaghaei and Calic 2020). However, the engineering of the corresponding applications is a highly demanding task. Therefore, ways of reducing the complexity and increasing the accessibility are highly relevant (Volk et al. 2019). One of those approaches are reference architectures. By presenting proven ways to solve common implementation challenges on an architectural level, they support those developing new systems by offering guidance and orientation. A comprehensive overview of the existing big data reference architectures up until 2020 has been given in (Ataei and Litchfield 2020). Though, because there might have been new propositions since then, an update might be necessary.

Another concept that has the potential to improve the development of big data applications is the use of microservices (Freymann et al. 2020). Those allow to divide complex applications into small, independent, and highly scalable parts and, therefore, increase maintainability and allow for a more flexible implementation (Nadareishvili et al. 2016). Yet, the development is highly complex, since those services have to interact with each other to provide the desired capabilities. One way to reduce that complexity is the use of patterns. Comparable to reference architectures, they are proven suggestions how certain tasks could be solved. In the realm of microservices, there are numerous patters that can be utilized, depending on the desired properties of the developed system.

However, despite big data reference architectures and microservice patterns being established approaches on their own and the relevance of microservices in the context of big data, to our knowledge, there is no paper that properly connects both the concepts with each other. Nonetheless, an exploration of the touch points between them might help to deepen the understanding and facilitate the overcoming of certain weaknesses of the reference architectures. To bridge this gap, the publication at hand seeks to map the established microservice patterns to the existing big data reference architectures with the aspiration to solve some of their issues.

For this purpose, following this introduction as well as a background section and a description of the followed methodology, the literature review on big data reference architectures (Ataei and Litchfield 2020) is updated up until June 2022. Further, a thorough literature review on microservice patterns is conducted, complying with the Prisma guidelines (Page et al. 2021). Subsequently, the identified patterns are matched to the updated list of big data reference architectures. Finally, the results are discussed and a conclusion is given.

The contribution of the publication at hand is thereby threefold. It provides an updated synopsis of the existing big data reference architectures, it assembles an overview of relevant microservice patterns and, most importantly, it creates a connection between those concepts to facilitate solving some of the related issues.

# Bibtex

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@inproceedings{Ataei.2020,

author = {Ataei, Pouya and Litchfield, Alan},

title = {Big Data Reference Architectures, a systematic literature review},

publisher = {AIS},

booktitle = {Australasian Conference on Information Systems (ACIS) 2020},

year = {2020}

}

@inproceedings{Freymann.2020,

author = {Freymann, Andreas and Maier, Florian and Schaefer, Kristian and B{\"o}hnel, Tom},

title = {Tackling the Six Fundamental Challenges of Big Data in Research Projects by Utilizing a Scalable and Modular Architecture},

pages = {249--256},

publisher = {{SCITEPRESS - Science and Technology Publications}},

isbn = {978-989-758-426-8},

booktitle = {Proceedings of the 5th International Conference on Internet of Things, Big Data and Security},

year = {2020},

doi = {10.5220/0009388602490256}

}

@article{Ghasemaghaei.2020,

author = {Ghasemaghaei, Maryam and Calic, Goran},

year = {2020},

title = {Assessing the impact of big data on firm innovation performance: Big data is not always better data},

pages = {147--162},

volume = {108},

number = {2},

issn = {01482963},

journal = {Journal of Business Research},

doi = {10.1016/j.jbusres.2019.09.062}

}

@article{Levin.2021,

author = {Levin, Ilya and Mamlok, Dan},

year = {2021},

title = {Culture and Society in the Digital Age},

pages = {68},

volume = {12},

number = {2},

journal = {Information},

doi = {10.3390/info12020068}

}

@book{Nadareishvili.2016,

author = {Nadareishvili, Irakli and Mitra, Ronnie and McLarty, Matt and Amundsen, Michael},

year = {2016},

title = {Microservice architecture: Aligning principles, practices, and culture},

address = {Beijing and Boston and Farnham and Sebastopol and Tokyo},

edition = {First edition},

publisher = {O´Reilly},

isbn = {978-1-491-95625-0}

}

@article{Page.2021,

author = {Page, Matthew J. and Moher, David and Bossuyt, Patrick M. and Boutron, Isabelle and Hoffmann, Tammy C. and Mulrow, Cynthia D. and Shamseer, Larissa and Tetzlaff, Jennifer M. and Akl, Elie A. and Brennan, Sue E. and Chou, Roger and Glanville, Julie and Grimshaw, Jeremy M. and Hr{\'o}bjartsson, Asbj{\o}rn and Lalu, Manoj M. and Li, Tianjing and Loder, Elizabeth W. and Mayo-Wilson, Evan and McDonald, Steve and McGuinness, Luke A. and Stewart, Lesley A. and Thomas, James and Tricco, Andrea C. and Welch, Vivian A. and Whiting, Penny and McKenzie, Joanne E.},

year = {2021},

title = {PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews},

pages = {n160},

volume = {372},

journal = {BMJ (Clinical research ed.)},

doi = {10.1136/bmj.n160}

}

@inproceedings{Volk.2019,

author = {Volk, Matthias and Staegemann, Daniel and Pohl, Matthias and Turowski, Klaus},

title = {Challenging Big Data Engineering: Positioning of Current and Future Development},

pages = {351--358},

publisher = {{SCITEPRESS - Science and Technology Publications}},

isbn = {978-989-758-369-8},

booktitle = {Proceedings of the 4th International Conference on Internet of Things, Big Data and Security},

year = {2019},

doi = {10.5220/0007748803510358}

}

Publication bibliography

Ataei, Pouya; Litchfield, Alan (2020): Big Data Reference Architectures, a systematic literature review. In : Australasian Conference on Information Systems (ACIS) 2020. Wellington, New Zealand: AIS.

Freymann, Andreas; Maier, Florian; Schaefer, Kristian; Böhnel, Tom (2020): Tackling the Six Fundamental Challenges of Big Data in Research Projects by Utilizing a Scalable and Modular Architecture. In : Proceedings of the 5th International Conference on Internet of Things, Big Data and Security. 5th International Conference on Internet of Things, Big Data and Security. Prague, Czech Republic, 07.05.2020 - 09.05.2020: SCITEPRESS - Science and Technology Publications, pp. 249–256.

Ghasemaghaei, Maryam; Calic, Goran (2020): Assessing the impact of big data on firm innovation performance: Big data is not always better data. In *Journal of Business Research* 108 (2), pp. 147–162. DOI: 10.1016/j.jbusres.2019.09.062.

Levin, Ilya; Mamlok, Dan (2021): Culture and Society in the Digital Age. In *Information* 12 (2), p. 68. DOI: 10.3390/info12020068.

Nadareishvili, Irakli; Mitra, Ronnie; McLarty, Matt; Amundsen, Michael (2016): Microservice architecture. Aligning principles, practices, and culture. First edition. Beijing, Boston, Farnham, Sebastopol, Tokyo: O´Reilly.

Page, Matthew J.; Moher, David; Bossuyt, Patrick M.; Boutron, Isabelle; Hoffmann, Tammy C.; Mulrow, Cynthia D. et al. (2021): PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. In *BMJ (Clinical research ed.)* 372, n160. DOI: 10.1136/bmj.n160.

Volk, Matthias; Staegemann, Daniel; Pohl, Matthias; Turowski, Klaus (2019): Challenging Big Data Engineering: Positioning of Current and Future Development. In : Proceedings of the 4th International Conference on Internet of Things, Big Data and Security. 4th International Conference on Internet of Things, Big Data and Security. Heraklion, Crete, Greece, 02.05.2019 - 04.05.2019: SCITEPRESS - Science and Technology Publications, pp. 351–358.