GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Non-Relational Databases, PG_00067288		
Field of study	Informatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2029/2030
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	blended-learning
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Software Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Grzegorz Gołaszewski	
	Teachers	dr inż. Grzegorz Gołaszewski	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 15.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	45	4.0	26.0	75

Subject objectives	The main goal is to introduce theoretical issues of NoSQL databases. Moreover, three types of NoSQL databases are presented. After this course students should be acquainted with MongoDB, Redis and Neo4J.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	The student knows how to choose the appropriate database for specific business applications.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K6_W44] knows and understands, to an advanced extent, architecture, design principles and methods of hardware and software support for local and distributed information systems, including computing systems, databases, computer networks and information applications, as well as the principles of human-computer interaction, the operation and evaluation criteria of data processing, storage and transfer methods, including computational algorithms, artificial intelligence and data mining as well as standards and methods of IT systems administration, monitoring of processes and robustness to undesirable phenomena and activities	The student is familiar with NoSQL data models: documents, graphs and key-value data structures. Additionally the student knows models of data distribution: sharding and replication, and CAP and BASE theories.	[SW1] Assessment of factual knowledge
[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study	The student is able to assess the database design by checking the feasibility of queries.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
1. Introduction to NoSQL databases

- types of NoSQL databases
- introduction to distributed databases
- CAP
- BASE

2. Document database - MongoDB
3. Key-value databases - Redis
4. Graph databases - Neo4J

Course content – laboratory
Document databases:
- JSON/BSON notation,
- MongoDB Query Language (MQL),
- Aggregation pipeline.

Key-value databases:
- Redis query language,
- Data types available in Redis,
- Pseudo-indices.

Graph Databases:
- practical examples of graph database design,
- CYPHER language,
- execution of graph analysis algorithms.

<table>
<tr><td>Prerequisites and co-requisites</td><td>1. Knowledge of relational modeling

2. Very good knowledge of SQL language

3. Knowledge of OLTP</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam</td><td>50.0%</td><td>20.0%</td></tr>
<tr><td>Workshop tasks</td><td>50.0%</td><td>80.0%</td></tr>
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</td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Professional NoSQL, Shashanki Tiwari, Wiley, 2011.
2. MongDB, The Definitive Guide, Kristina Chodorow, O'Reilly, 2013.
3. Graph Databases: New Opportunities for Connected Data, Ian Robinson and Jim Webber, O'Reilly 2015.</td></tr>
<tr><td>Supplementary literature</td><td>Documentation of NoSQL databases.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Model NoSQL database (of any type).
2. Define and execute queries.
3. Simulate distribution of data.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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