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## PRISM -- Privacy-Preserving Search in MapReduce

*Erik-Oliver Blass and Roberto Di Pietro and Refik Molva and Melek Onen*

**Abstract:** We present PRISM, a privacy-preserving scheme for word search in cloud computing. Assuming a curious cloud provider, privacy of data stored in the cloud becomes an issue. The main challenge in the context of cloud computing is to design a scheme that achieves privacy while preserving the efficiency of cloud computing. Main approaches like simple encryption, Private Information Retrieval (PIR) and encrypted word search fall short of meeting these requirements. PRISM assures privacy against the cloud by combining a PIR technique with the MapReduce cloud computing paradigm. The problem of word search is transformed into a set of parallel instances of PIR on small datasets. Each PIR instance on a small dataset is efficiently solved by a node in the cloud during the 'Map' phase of MapReduce. Outcomes of map computations are then aggregated during the 'Reduce' phase. Due to the linearity of PIR, the simple aggregation of map results yields the final output of the word search operation. We have implemented PRISM on Hadoop MapReduce and evaluated its efficiency using real-world DNS logs. The overhead of PRISM over non-private search is only 11%. Thus, PRISM offers privacy-preserving search that meets cloud computing efficiency requirements. Moreover, PRISM is compatible with standard MapReduce, not requiring any change to the interface or infrastructure.

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**Contact author:** Blass Erik-Oliver

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