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(54) **PRIVATELY QUERYING A DATABASE WITH PRIVATE SET MEMBERSHIP USING SUCCINCT FILTERS**

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(57) **ABSTRACT**

A method includes obtaining, from a server, a filter including a set of encrypted identifiers each encrypted with a server key controlled by the server. The method includes obtaining a request that requests determination of whether a query identifier is a member of a set of identifiers corresponding to the set of encrypted identifiers. The method also includes transmitting an encryption request to the server that requests the server to encrypt the query identifier. The method includes receiving, from the server, an encrypted query identifier including the query identifier encrypted by the server key and determining, using the filter, whether the encrypted query identifier is not a member of the set of encrypted identifiers. When the encrypted query identifier is not a member of the set of encrypted identifiers, the method includes reporting that the query identifier is not a member of the set of identifiers.