$general\_access\_list\_sp \in service\_providers \leftrightarrow health\_record\_DB$ $restricted\_access\_list\_sp \in service\_providers \leftrightarrow health\_record\_DB$ $revoked\_list\_sp \in service\_providers \leftrightarrow health\_record\_DB$ $general\_access\_list\_sp \cap restricted\_access\_list\_sp \cap revoked\_list\_sp = \varnothing$ $general\_access\_list\_sp \cup restricted\_access\_list\_sp \cup revoked\_list\_sp = access\_sp\_record$ $record\_general\_list \in records \leftrightarrow health\_record\_DB$ $record\_restricted\_list \in records \leftrightarrow health\_record\_DB$ $record\_hide\_list \in records \leftrightarrow health\_record\_DB$ $record\_general\_list \cap record\_restricted\_list \cap record\_hide\_list = \varnothing$ $record\_general\_list \cup record\_restricted\_list \cup record\_hide\_list = record\_mhr$