18734 Recitation

- English -> Logic -> REDUCE language

Project

- Reminder for finalizing teams and deciding on a project

A covered entity may disclose an individual's protected health information (phi) to law-enforcement officials for the purpose of identifying an individual if the individual made a statement admitting participation in a violent crime that the covered entity believes may have caused serious physical harm to the victim

send(p1, p2, m): p1 sends message m to p2.
tagged(m, q, t, u): m is a message containing information with attributes t about q with purpose u.
inrole(p2, law-enforcement-official): p2 has the role 'law-enforcement-official'.
attr_in(t, phi): t contains 'protected health information'.
purp_in(u, id-criminal): purpose u is identifying a criminal.
state(q,m'): q states m'.
is-admission-of-crime(m'): m' is an admission of crime.
believes-crime-caused-serious-harm(p1, q, m'): p1 believes q may have caused serious harm.

A covered entity may disclose an individual's protected health information (phi) to law-enforcement officials for the purpose of identifying an individual if the individual made a statement admitting participation in a violent crime that the covered entity believes may have caused serious physical harm to the victim

$$
\begin{aligned}
&\forall p1, p2, m, u, q, t. \\
&\quad (\text{send}(p1, p2, m) \\
&\qquad \wedge \text{tagged}(m, q, t, u) \\
&\qquad \wedge \text{attr\_in}(t, \text{phi})) \\
&\qquad \supset \\
&\qquad\quad \text{inrole}(p1, \text{covered-entity}) \wedge \text{inrole}(p2, \text{law-enforcement-official}) \\
&\qquad\quad \wedge (\text{purp\_in}(u, \text{id-criminal})) \\
&\qquad\quad \wedge \exists m'. \Diamond\!\!\!\!-\!\!\!\!> \text{state}(q, m') \wedge \text{is-admission-of-crime}(m') \\
&\qquad\quad \wedge \text{believes-crime-caused-serious-harm}(p1, q, m')
\end{aligned}
$$

A covered health care provider providing emergency health care in response to a medical emergency, other than such emergency on the premises of the covered health care provider, may disclose protected health information to a law enforcement official if such disclosure appears necessary to alert law enforcement to:
(A) The commission and nature of a crime;
(B) The location of such crime or of the victim(s) of such crime; and
(C) The identity, description, and location of the perpetrator of such crime

send(p1, p2, m) **tagged(m, q, t, u)** **attr_in(t, phi)**
inrole(p2, <roles>): Two roles to be used are ``health-care-provider'' and ``law-enforcement-official''
purp_in(u, <purpose>): One purpose is ``alert''

providing-emergency-healthcare(p1, q): p1 is providing emergency healthcare to q.
appears-necessary(p1, p2, q, t, u): p1 thinks it is necessary to alert of crime-commission-location-victims-perpetrator to p2 with message about q with attribute t and purpose u.

Answer?

Answer?

$\forall$ p1, p2, m, u, q, t.
(send(p1, p2, m)
$\wedge$ tagged(m, q, t, u)
$\wedge$ attr_in(t, phi))
$\supset$
inrole(p1, health-care-provider)
$\wedge$ inrole(p2, law-enforcement-official)
$\wedge$ (purp_in(u, alert))
$\wedge$ providing-emergency-healthcare(p1, q)
$\wedge$ appears-necessary(p1, p2, q, t, u)

Policy Composition

Norms of transmission in privacy laws

Positive norms, φ_i^+: Transmission *may occur* if condition is satisfied.

- "A covered entity may disclose protected health information for treatment activities [...]." [HIPAA §164.506(c)(2)]

Negative norms, φ_j^-: Condition *must be satisified* if transmission occurs.

- "A covered entity must obtain an authorization for any use or disclosure of psychotherapy notes." [HIPAA §164.508(a)(2)]

A transmission is lawful if and only if it satisfies at least one of the law's positive norms and all of the law's negative norms.

$$\mathit{maysend}(p_1, p_2, m) \triangleq \left(\bigvee_{\cdot} \varphi_i^+\right) \wedge \left(\bigwedge_{\cdot} \varphi_j^-\right)$$

$$\mathbf{G}\ \left(\forall p_1, p_2, m.\ \left(\mathsf{send}(p_1, p_2, m) \supset \mathsf{maysend}(p_1, p_2, m)\right)\right).$$

$\forall$p1, p2, m, u, q, t.
(send(p1, p2, m)
$\wedge$tagged(m, q, t, u)
$\wedge$attr_in(t, phi))
$\supset$

inrole(p1, covered-entity) $\wedge$ inrole(p2, law-enforcement-official)
$\wedge$ (purp_in(u, id-criminal))
$\wedge$ $\exists$ m'.$\diamond\!\!\!\!-\!\!\!\!\rightarrow$state(q,m') $\wedge$is-admission-of-crime(m')
$\wedge$ believes-crime-caused-serious-harm(p1, q, m')

$\forall$p1, p2, m, u, q, t.
(send(p1, p2, m)
$\wedge$ tagged(m, q, t, u)
$\wedge$ attr_in(t, phi))
$\supset$

inrole(p1, health-care-provider)
$\wedge$ inrole(p2, law-enforcement-official)
$\wedge$ (purp_in(u, alert))
$\wedge$ providing-emergency-healthcare(p1, q)
$\wedge$ appears-necessary(p1, p2, q, t, u)

$\forall$p1, p2, m, u, q, t.
(send(p1, p2, m)
$\wedge$tagged(m, q, t, u)
$\wedge$attr_in(t, phi))
$\supset$ (

inrole(p1, covered-entity) $\wedge$ inrole(p2, law-enforcement-official)
$\wedge$ (purp_in(u, id-criminal))
$\wedge$ $\exists$ m'.$\diamond$state(q,m') $\wedge$is-admission-of-crime(m')
$\wedge$ believes-crime-caused-serious-harm(p1, q, m')
)

$\vee$

(
inrole(p1, health-care-provider)
$\wedge$ inrole(p2, law-enforcement-official)
$\wedge$ (purp_in(u, alert))
$\wedge$ providing-emergency-healthcare(p1, q)
$\wedge$ appears-necessary(p1, p2, q, t, u)
)

A covered entity may disclose protected health information to a coroner or medical examiner for the purpose of identifying a deceased person, determining a cause of death, or other duties as authorized by law.

send(p1, p2, m) **tagged(m, q, t, u)** **attr_in(t, phi)**
inrole(p2, <roles>): Two roles to be used are ``covered-entity'', ``coroner'' and ``medical-examiner''
purp_in(u, <purpose>): One purpose is ``identification(q)'', ``deteremine-cause-of-death(q)''

is-authorized-by-law(p2, u): p2 is authorized by law to carry out activities for purpose u.
belongrole(q, deceased) [subjective predicate]: q has the role "deceased"

Answer?

Answer?

$\forall$ p1, p2, m, u, q, t.
(send(p1, p2, m)
$\wedge$ tagged(m, q, t, u)
$\wedge$ attr_in(t, phi))
$\supset$
inrole(p1, covered-entity)
$\wedge$ ((inrole(p2, coroner)
V inrole(p2, medical-examiner)
)
$\wedge$ belongstorole(q, deceased)
$\wedge$(purp_in(u, identication(q))
V purp_in(u, determining-cause-of-death(q))
V authorized-by-law(p2, u)
)

Prefix Notation

- Infix: 3+4, Prefix +3 4, Postfix: 3 4 +
- REDUCE understands prefix notation

infix	prefix(ish)
(a) and (b)	and (a) (b)
(a) or (b)	or (a) (b)
(a) imp (b)	imp (a) (b)
(a) plus (b)	plus (a) (b)
$\forall x, y.\ c(x, y) \supset B(x, y)$	all $[x][y]$ $(c(x, y))$ $(B(x, y))$
$\exists x, y.\ c(x, y) \wedge b(x, y)$	ex $[x][y]$ $(c(x, y))$ $(b(x, y))$
predicate-name(arg1, ...)	(predicate-name arg1 ...)

Convert to prefix notation

∀p1, p2, m, u, q, t.
(send(p1, p2, m)
∧tagged(m, q, t, u)
∧attr_in(t, phi))
⊃
inrole(p1, covered-entity) ∧ inrole(p2, law-enforcement-official)
∧ (purp_in(u, id-criminal))
∧ ∃ m'. state(q,m') ∧is-admission-of-crime(m')
∧ believes-crime-caused-serious-harm(p1, q, m')

Answer?

Convert to prefix notation

```
all p1, p2, m, u, q, t.
    ( and
        (send(p1, p2, m))
        (tagged(m, q, t, u))
        (attr_in(t, phi)))
    ( and
        (inrole(p1, covered-entity))
        (inrole(p2, law-enforcement-official))
        (purp_in(u, id-criminal))
        (ex m'
            ( state(q,m'))
            ( and
                (is-admission-of-crime(m'))
                (believes-crime-caused-serious-harm(p1, q, m'))))
```