**lock stack*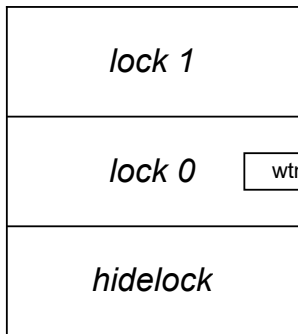*