Self-assembly pervades nature, from the coalescence of iron oxide nanoparticles to the collective motion of flocks of birds. To understand self-assembly, we devised a set of simple local rules to simulate the swarming of Western honey bees (*Apis mellifera*), thereby giving rise to a spectrum of interesting emergent states characterised by their morphology and behavior. Parameterised by two variables, a *crawl rate* (how fast bees attached to the wooden board advance towards the queen) and a *climb rate* (how vigorously bees at the peripheral of the structure attempt to scale the inverted mount), we were able to yield structures akin to those recorded in the physical world. These findings were then corroborated with empirical data established in the literature. Our simulation reveals that at lower-density regions, a diagonally-centered square lattice is the prevalent structure, while at higher-density regions, this lattice breaks down into an amorphous mesh of bees with a higher degree of connectivity.