NIM game, a binary challenge

Nim is a simple combinatory game with finite possibilities. But unlike tic-tac-toe, that other game of limited possibilities, there is tremendous variety in both Nim's conception and implementation. The theory of the Nim game was discovered by mathematics professor Charles Bouton at Harvard University in 1901. In fact, Bouton, who wanted to use the game to demonstrate the advantage of the binary number system, found a simple formula, with which, from the state of play, players can determine correct moves immediately.

Nim is said to have originated in China (where it wasn't called *Fan Tan* as many assert! But *Tsyanshidzi* [*Jian-shizi*?], "picking stones game"), but the origin remains uncertain and the current name of this game is a loan word from the German verb **nimm** (meaning "take!"). Nim-type games have existed for centuries around the world, and the first European references date from the 15th century. There is also an African variant of the game called tiouk tiouk. Nim was evidently played with whatever counters were at hand and can be played with from one to at least a dozen rows, and the number of counters in a row can vary from one to as many as two dozen. Some versions require that the winner takes the last object; others that the winner avoids taking the last object.

The classical Nim game is a game played with two players. It consists of 16 counters in 4 rows (see image above). Two players alternately pick a certain number of counters. In one move, you can remove any number of counters but only from one row. You win if you leave the LAST match for your opponent. Players alternate who starts first.

Discussion:

1. How do you win the game of Nim? Did you notice any patterns or strategies?
2. Is there an advantage to going first? How about going second?
3. Did you know that Nim was one of the first games where an "electronic brain" was able to consistently beat humans? Why do you think this game could be programmed to continuously win?
4. Why is the game referred to as “a binary challenge” in the title?
5. Do you have to start with 16 counters? How about the pattern of 1, 3, 5, 7?