The 9th World Chess Software Championship (WCSC) started on August 11, 2019. Six programs participated in a double round robin tournament of ten rounds. The tournament took place at the Venetian Macao Hotel Resort in Macau, China and was organized by the ICGA. The venue was part of the 28th International Joined Conference on Artificial Intelligence (IJCAI-19) who acted also as the main sponsor. The other important sponsor was Digital Game Technology (DGT) for the electronic chess boards. Chessbase donated an extra prize for the first position. The WCSC was held in conjunction with the 25th World Computer Chess Championship (WCCC) and the 2019 World Computer Speed Chess Championship. The tempo of 45’+15’’ per move for both sides was used.

In the WCSC all programs play on the same hardware platform. This year the hardware made available by the IJCAI organization was a Lenovo .. with an Intel Pentium Silver N5000 CPU at 1.1 GHz with 4 GB internal memory, a 64-bit Windows 10 operating system and 128 GB SSD hard drive. The general opinion that the system was rather limited with respect to current technological possibilities. For instance, there was no disk space for the 7-men endgame databases.

Round 1

Ginkgo - The Baron 1-0
Chiron - Jonny 1/2
Komodo - Shredder 1-0

The game Ginkgo – The Baron followed well-trodden paths. The opening was an accepted Queens Gambit. Nowadays the moves are available via variety of opening books. Ginko was the first to leave the book but The Baron continued to move 21. Not because there was further material available, but it was simply not incorporated in either program. The Hiarcs book continued a line up to move 27 (equal to the game continuation) and even thereafter it gave another four moves. The evaluation of the position by both sides at move 21 was equal. From move 21 to 30 there was nice interplay of small combinations which did not destroy equality. After white’s move 30 there was a queen and rook ending of which insiders speculated it would end in a draw. However, computers are still not predictable nowadays and they showed us unexpected decisions which influenced the material balance but in fact not the outcome of the game. See diagram:
First black played 30. ..., Rhd8 offering white to follow an interesting line. White took up the challenge and played 31. Rg3+, whereafter black played 31. .., Qxg3, 32. fxg3, Rxd7. Exact evaluation is difficult but common chess knowledge teaches us that a draw is the foreseeable outcome. Taking decisions in an unbalanced situation is difficult and the next 20 moves saw white executing dynamic play with the queen which resulted in an exchange of many pawns ending in an endgame with two separated pawns (a and g pawns) and a queen versus two rooks. The strategic line for chess players was straight forward. Defend on the 5th row with two rooks on that row and a king behind the two rooks. Yet the Baron was hampered by that the fact that according to his author Richard Pijl: ‘The Baron believed it was two pawns down.’ Henceforth all decisions to be taken were influenced by this knowledge. As a consequence, the black king started to be active, crossed the middle line of the chess board and walked to the corner square h1. At that moment white outplayed the black position by a simple mating threat (see diagram 2).

Black is forced to play 92. .., Rc3+ and thereafter the white pawns turned out to be mobile again and hence a threat for black. Within ten moves the a-pawn and c-pawn had progressed one square each. At that time black resigned and Wolfgang Zugrav accepted the resignation. For the readers it is interesting to know that Erdogan Gunes checked on his iPhone with the 7-men endgame database and the result was a win for white.
The game Chiron – Jonny started very quietly with the Giuoco Piano. Pieces were placed on the right squares and around move 14 Jonny was out of book. It played 11. ..., Qe7 and from that moment it had to find its own way. The first crucial moment arose after 27. ..., Qa3, see the diagram:

The normal move would have been 28. Ra1. It was not clear what white had in mind when playing 28. b6. Black won a pawn, but it was not sufficient for a win. White defended accurately and in a rook endgame of two against three pawns it managed to draw the game.

World champion Komodo was playing the former world champion Shredder. It was a Slav game in which they followed a well-known opening line up to move 13. ..., a5. The first interesting point in the game appeared on the fifteenth move when black played 15. ..., o-o, see diagram:

It is difficult to see that the castling to the kingside brings black into trouble. A deeper analysis in which pros and cons are weighed brings to light that white can easily stop the black attack on the queenside but black has more difficulties to stop the aggressive white maneuvers on the kingside. To profit from the ideas described above it requires professional insight. The white program showed clearly its abilities in this respect. On move 23 white achieved its goal by playing 23. e5. See diagram:
It took still more than 20 moves before white had made a step forward in achieving its goal to weaken some black squares and occupying them without any risk of neutralizing exchanges. See diagram:

White took the initiative by playing 44. Nc5. After a shuffling around with rooks and bishops white managed to penetrate the black position. With the maneuver Qb5-a4 it created a passed pawn that was unstoppable. Note that the exchange of queens was forced and that the passed a-pawn was an unavoidable asset for white. Black resigned after few more moves.

Round 2

The Baron – Shredder 1/2
Jonny – Komodo 1/2
Ginkgo – Chiron 1/2

The Baron – Shredder followed the same opening as Komodo – Shredder in the first round. However, Shredder had learned its lessons and did not take the castling on the kingside into account. Therefore, the game developed via completely other lines. After a series of exchanges the strategic threat which had typified Shredder’s game in the first round had been disappeared and castling to the kingside was possible. See diagram:
The tactical issues are not characteristic for this position. Soon the game landed in a quiet environment. After 45. Rd1 an implicit exchange of rooks took place. The ensuing endgame was drawn but realization took some time. It almost started to be exciting when black managed to force white king to march to black back rank. Owing to the only availability of the black queen there was no danger for the white king. The complications at the end of the game did not imply any danger for either side.

Jonny – Komodo did not excite the public although it should be admitted that opponents who do not possess grandmaster strength would be impressed by the maneuvers of either side. Deeper insight into the position clearly shows that the balance never showed the slightest flaw from the equilibrium. After 50 moves the opponents agreed to a draw.

Ginkgo – Chiron started as Giuoco Piano, one of the favourite openings of this championship. Up to move 32 there was no excitement to report in this game. Black had obtained some small opportunities and believed with his 32. ..., Bh3 it was time for action. See diagram.

After 33. Re1, g4 34. Qd2 black played the interesting move g5. This maneuver gave white the opportunity to disbalance the pawn structure. It resulted in black having a locked bishop and a passed pawn and white having a breakthrough possibility at the kingside. With ingenious play white managed to transform its breakthrough on the queenside a passed pawn on the
queenside. Moreover, closer analysis showed that the locked bishop was still a powerful peace. Hence white decided to exchange bishops. After pushing the passed a-pawn to the seventh rank the position became double-edged. White must have seen his defensive possibilities quiet in advance. So, the move 54. h4 did not come as a surprise for both sides. See diagram:

White has computed very well that the two black passed pawns did not entail a real threat since the rook sacrifice on b6 is an essential maneuver in whites plan. Hence black played 54. .. Rhe8. After some maneuvering white managed to give perpetual check. A draw.

Round 3

Chiron - The Baron 1-0
Komodo - Ginkgo 1/2
Shredder - Jonny 1/2

The game Chiron – The Baron was a Catalan variation in which the Baron optimistically played 10. .. f5. See diagram:

At the moment of play the disadvantages were not clear. However, soon it turned out that white could develop his pieces quite easily and exchange the right pawns in the center. It all
resulted in a weak pawn on e6. The piece activity of black was in first instance acceptable compensation but after annihilation by white the weak pawn on e6 attracted many white pieces. See diagram:

In the end the pawn was lost (29. Qxe6), no compensation was to be found and white regrouped the pieces for a final attack on the queenside in combination with a progressing passed pawn. It let to the resignation by the Baron.

The game Komodo – Ginkgo was a Sicilian game of modern snit with a choice of taking the pawn on d5. See diagram:

Wolfgang Zugrav stated that the usual move Nbxd5 leads to interesting games and the other move Nfxd5 to an equal endgame. There was no incentive given to the program but it chose for the simple game. It relied on a small trick which occurred after 18. .. Na4, see diagram:
The move 19. Rxf6 is impossible by 19. .. Ke7. It all implied a fast regrouping of the pieces and an exchange of rooks and pawns. The resulting endgame of differently colored bishops with an equal number of pawns was a clear draw.

The game Shredder against Jonny was one out of a large set of encounters. The number of encounters is unknown to the human operators Stefan Meyer-Kahlen and Johannes Zwanzger. In the Slav opening black relied on a fast progress of the queenside pawns. The move 13. .. c5 was a surprise to Shredder. See diagram:

The continuation was 14. dxc5, Rc8 15. axb4, axb4 16. Bxh7+, Nxh7 17. Rxd6. It was a surprising series of moves for human beings but the computer programs had both computed this line as equal. Still the configuration was characterized by rooks and pieces that were not protected. See diagram:
White played 20. Nb6. The continuation was 20. .. Rb7 21. Ra5, Qe5 22. Rd2, b3 23. Qc4, Rb8 24. Rb5, Qf5 25. Nd5. The dance of the pieces found its combination in 25. Nd5, see diagram:

It is remarkable that both programs were not impressed the threats of the opponent. They continued their own plan. This turned out to be the best way and led to an equal position. The queens were exchanged, and the triple pawn of white was not a disadvantage for the white position. After some 20 more moves the draw was agreed.

Standing after three rounds: 1. Komodo, Ginkgo, Chiron 2; 4. Jonny 1.5; 5. Shredder 1; 6. The Baron 0.5.

Round 4

The Baron - Jonny 0-1
Ginkgo - Shredder 1/2
Chiron - Komodo 0-1

The Baron – Jonny showed that opening playing style and strategic decisions should be tuned in harmony during the preparation of the game. Every move is a decision and five decisions in a row cannot be played without harmony. In the beginning it is not clear why the moves are not in harmony, but an experienced program is tuned to reveal the weaknesses of the
The game Ginkgo – Shredder started with a Sicilian opening and followed the well-known Scheveningen variation. The dynamics of the game require utmost alertness from both sides. And a small step next to the equilibrium line can be fatal. For both sides the intriguing question was: what is the value of 41. Bd6?
Obviously black has to sacrifice the exchange for a pawn and both programs assumed that it happened all in the draw area. As the game continued it looked like that this has been the case. We advise the reader to replay the game on the board, then you will arrive in the final position in which a draw was agreed (see diagram).

The tablebases of both programs agreed on the draw result. Hence this was the official outcome. Closer inspection taught us that the current position is a win in 79 moves. According to the FIDE rules it is a draw (50 moves rule), however it raised the question how current computer programs handle the tablebases. In the case at hand Shredder had the parameters set on obeying the 50 move rule. All in all a nice game, an interesting result but in general not an advice to follow this line again since a slight difference can have huge consequences for the outcome.

Chiron - Komodo was a fantastic game. It was a spectacular fight for the initiative in which Chiron was active on the kingside and Komodo on the queenside. The activities employed after the opening showed a great deal of subtlety. White emphasized a kingside attack and did not care about the loss of a pawn at the queen side (see diagram).
Black was convinced that his pieces at the kingside were well-positioned for defending against the white threats. Therefore he took the time to take the white pawn on a6. White replied goal directedly by playing 28. e5 Nh7 29. f4, Rb6 30. g4, a5 31. f5. Meanwhile black was active on queenside and pushed his pawns energetically forward. The question was: who will be the first?

White had a nice combination in mind and played 36. e6 followed by 36. .. fxe6 37. Rxe4. The board was full of fire and the ideas for successful continuations were omnipresent. On move 40 black decided to give his queenside attack more power by pushing the b-pawn one more step to his promotion square by playing 40. .. b3, see diagram.
The position became more excited after 41. Qc6, Rb8 42. Bg3 Qd8 43. d5, Rb6 44. Qc2, b2. See diagram.

Time for reconsideration and repositioning of the pieces on both sides. White used its a-pawn as asset: 45. Rc2, Bd6 46. Bxd6 Qxd6 47. Qc5 Qb8 48. a5, Rb5 49. Qf2 Nf6 50. a6 Re7. See diagram:
The last move definitely stopped the advancement of the a-pawn. White had to take into the account the possibilities of the black knight and did not find a good solution. The game continued by 51. Kh1 Ng4 52. Qg1 Qf4 53. Bh3 Qe4+ 54 Qg2 Nf2+ 55. Rxf2 Qxb1+ and white resigned.

Standings after round 4: 1. Komodo 3; 2. Ginkgo, Jonny 2.5; 4. Chiron 2.5; 5. Shredder 1.5; 6. The Baron 0.5.

**Round 5**

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Komodo – The Baron was a game in which the Baron showed itself from its best side: playing, playing and playing. It is a game which we can nowadays very fast replay by a computer and then pick up the feeling which black must have had when he became aware from the fact that his defense would not be sufficient for a draw. The game required 134 moves and ended in an endgame with queen against queen and f-pawn. The tablebase of the Baron was not precisely well communicating the distances to win and therefore the game looked now and then a draw. Reality showed otherwise and Komodo won.

Shredder – Chiron played a semi Tarrasch with a fast exchange of queens. The knights were very active either to defend or to regain a pawn. After the opening fight was over the game turned into more quiet waters in which both sides found themselves well. There were no exciting moments and techniques from both sides assured that the draw margin was never passed. It was a deserved draw.

Jonny – Ginkgo was Guioco Piano with adequate play from both sides. How piano the game was is not clear since black managed to achieve a position with a pawn up. At the beginning white had some counterplay but that disappeared by the exchange of many pieces, pawns and rooks. In the end a rook ending with 3 versus 2 pawns came on the board. It required precise defense but there was never a possibility to obtain more than a draw. Which was the result after 62 moves.

Standing after round 5: 1. Komodo 4; 2. Ginkgo, Jonny 3; 4. Chiron 2.5; 5. Shredder 2; 6. The Baron 0.5.

**Round 6**

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In The Baron – Ginkgo black played the opening a bit unusual to get the Baron playing on his own thoughts. The implicit consideration was of course to seduce the Baron playing moves that did not fit the position quite adequately. Up to some extent black managed to get some positional advantage on the kingside which white hope to compensate with activities on the
queenside. However, white could not find the right plan and in the diagram position after 25. Bd2, it is clear that the threats as exhibited by black are more promising than the white ones.

The plan for black is quite easy, namely bringing all pieces over to the kingside. Whereas for white it is more difficult to bring over to the queenside since the entries for penetration are not clear. In the game forward and backward maneuvering of the white pieces. This gave black the opportunity to perform the final knocking on white’s king door which led to advantageous end of the game.

The game continued by 32 ... g3 33. fxg3, hxg3 34. hXg3, Bh8 35. Nb5, Rh7 36. gxf4, exf4 37. Rxd7, Dh2+ and after 15 more moves white resigned.

In the game Jonny – Chiron the English opening led to an even position at the beginning of the middlegame. Yet, both programs are rather ambitious and were searching for possibilities to employ the activities. White acted cautiously but black showed more power in his maneuvers. It brought white into a defensive position in which care was of utmost importance see the diagram.
Here white to reply on the move 31. .. Bxg4. It did not play the obvious 32. Nxe4 but 32. e3. That was a clever defense. The game continued by the moves 32. .. Bh3 33. exd4, Bxd4 34. Kh1, Bxb2 35. Qxb2, Ra2 36. Qd4, Qxf2 37. Qd8+, Qf8 38. Qd5, Qf7 39. Qxf7, Kxf7 and entering into a drawn endgame.

Shredder – Komodo was a contest between two strong players that did not give in on either side. They fought for power in the center and looked for small advantages. However, their play was also directed on annihilating potential threats so that the game continued without real excitement. Their mutual clever procedures led to a difficult endgame with a bishop against a knight with both sides a rook. But also, here the contenders showed to act on equal footing which implied that a draw was agreed at the end of the game.


Round 7

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The game Komodo – Jonny was an important meeting for the first place. Operator Erdogan voiced that playing a standard opening usually leads to the transition of an equal game in the middlegame. Trying to win means taking calculated risks. This game is an example of such a strategy. It worked almost well but Jonny was able held its own and so could constrain the white advantage during the game up to .65 in the evaluation function. The first deviation of the main line of the book opening (this means choosing a side line) was 8. g3. Thereafter both players positioned their pieces on relevant squares without deep thoughts or strategic lines in mind. Erdogan: ‘The first idea was 16. Ne1 with as strategic follow up f2-f4-f5 and having the opportunity of Qh5. As we all know Jonny is also strong program and took adequate countermeasures to this line. See the diagram position and the continuation thereof.'
To prevent white from the strategic line mentioned above black becomes successfully active on queenside as we will see: 16. ... Ra8 17. Rxa8, Qxa8 18. Nc2. Now 18. f4 was to be considered. As we will see black succeeded in developing active play at the queenside. By playing 21. Qf3 white showed to be prepared to change plans although it maintained the idea that the king attack should be the key to a victory. A tough fight followed, see the diagram below:

The continuation was 24. ... exf4 25. Bc3+, f6 26. Qd2, Qb3. Now the question is how does white give a follow up to his aggressive ideas. Komodo’s analysis showed a preference for a regrouping of the pieces with a clear eye on the black king. 27. Bf3, Ra8 28. Bd1, Qa2 29. Bb2, d5 30. h4, h6 31. bxc5, bxc5 32. Bg4, Qb3.
After this regrouping white calculated the time to be right for a new aggressive action and played 33. gxf4. Black followed with 33. .. Ra2 34. Rf2, Nxf4 35. Bxd7.

For humans this position might be difficult to analyze, for computers the evaluation is achieved by direct lines which show that white is still a bit better (0.5 pawn). Yet white has to play along a small path. 35. .. Kf7 (the threat was Bxf6+) 36. Bf5, Qxd3 37. Kh2, Ke8 38. Bg4, Kf7 39. Bd7, Qb3 40. hxg5, hxg5 41. Bf5, Qd3 42. Qc2, g4 43. Lxg4, Qxc2 44. Rxc2, Nd3. This looks like a difficult situation for white but deeper analysis shows that it is black who has to fight for a draw. Black did so successfully. The draw implied that Komodo remained the leader of the pack.

Chiron – Ginkgo started with a smooth development of both sides. Nowadays this is difficult to leave the opening book with an advantage. Both opening books are too well tuned. The main issue is the strategical handling of the resulting position. Tactically both programs know that there is no gain to be expected. Ginkgo was trying to build up a position that promises possibilities for attacks. It took a long time but on move 35 he believed its opportunity is there. See the diagram below:
Ginkgo decided to sacrifice the exchange for two pawns. The resulting dynamic position was tense but both programs remained calm and especially white found interesting ways to escape from the attack by black. Let we have a look at the situation. First we saw 35. .. Rxb5 36. Bxb5 Rxc3 37. Qxc2 Qxd4+ 38. Qf2 Qc3 39. Re1 Qxa3 40. Qe3 Qb4 41. Bd3 g6 42. e5, Nd5 43. Qf2, dxe5 44. Rxe5, Nf4. After some more moves black reached the following position. The threat is clear and the defense was computerlike. See diagram.

The computer played the normal move Qf3 defending the knight on f6. Obviously gxf3 is not an option and also not Qxg5 because of Qxc6. The game continues as follows: 51. Be4, Qf1 52. Bd5, a3 53. Qd4, h5 54. Bc4, Qf5 55. Rc7, Qa5 56. Ra7 Qb4 57. Ra8, a2 58. Qd3, Nge4. After a second regrouping it is still clear that black is looking for an attack in which he could combine the mating threats with queen knight around the white king. On the square meter a queen and two knights are more dangerous than a rook and bishop which do not cooperate. See diagram:
65. ... g4 is the start of a last big contest in this game. By the way it is fair to say that white defended excellently. 65. ... g4 66. Be2, Nc3 67. Rxc3, Qd4+ 68. Kh2, Qxc3. This is the best that black could achieve in this game. He is a pawn up, but it gives him nothing. The game lasted another 10 moves before the opponents agreed to a draw.

Shredder – The Baron was a contest between a formal world champion and a former runner up. Although the heydays of Shredder are in the past it still can convincingly play especially his opponent offers all kinds of possibilities. The Baron played sharp with the black pieces. This was just what Shredder hoped for. In a simultaneous exchange of pieces black was led to a lost position. In the diagram situation we see the run up for the winning combination.

By playing Bd5 white made the bishop on d7 indefinitely. This can be best seen from the game line. Black played: 24. .. Qxh4 25. Bf3, b4 26. Rc5 (to prevent Bb5), Qh1+ 27. Ke2, o-o. This is the only move but it loses a piece and thus the game.

The Baron – Chiron was a clear demonstration of the difference in playing strength. The Baron played white, had a good position after the opening and then had to find its own way. Creativity should still be guided by the best AI there is otherwise you can see what will happen to your plans. It was a simple misestimation of the disadvantages of putting the black queenside pawns on the black squares. The main task black was given was the exchange of the black squared bishops so that the pawns missed the defender. That was strategically the main issue. A rearrangement of the black pieces was necessary but also easy achieve. And this implied the win was an easy case. Below we give two diagrams. One with the beginning of mismanagement of the game (putting the white queenside pawns on the black squares) and the other diagram with the black pieces penetrating the white position.

24. .. Kg8, 25. Ng3, g6 26. Ne4, h5 27. Nc5, Bd6 28. Rd1, Bf4

39. .. f3, 40. Kg1, Qe2. A few more moves later The Baron resigned.
The game Ginkgo – Komodo was definitely not a grandmaster draw since it lasted 59 moves. However, the fight was not a tough fight and apart from that it was also not exciting. Clearly it was a matter of implicit respect for each other’s playing strength. Along the open e-file the rooks were exchanged, and other pieces disappeared in harmony from the battlefield. The bishop ending was a draw from the beginning up to the variant when the bishops disappeared. The resulting pawn endgame was also a draw. Both players might have been happy with this outcome although confirmed the superiority of Komodo.

The game Jonny – Shredder had a quiet opening. Apparently both players saved their powers for turbulence that they had in mind. In this phase Shredder played a bit cautiously. Zwanzger informed the commentators on two more aggressive moves. The first one is made by Shredder when he played Ng6 in the diagram position instead of Nf5.

The consequences were not severe and it required subtle maneuvering to exploit the defensive maneuver. An instance of such an exploitation could, according to Zwanzger, have been 23. b4. See diagram below:

Instead of that move white played Bd2 and gave black the opportunity to play Rc5 attacking the e-pawn. Thereafter black turned out to have quite some play: 23. .. c5 24. f4, Qg4 25. Qf3,
Bf5 26. Be4, Qxf3 27. Bxf3, Rc2 28. Rad1, Rxb2 29. Bc1, Rb3 20. Rxd4, Ne6. It resulted in a situation which was difficult to handle for human beings but not for computers because this regarding the unbalanced material the game was in the draw area. See diagram after 33. Bxb7 for some ideas on possibilities in unbalanced positions.

33. .. Rxc1 34. Rxc1, Ne2 35. Kh2, Nxc1 36. Bd5, Re3 37. Bxf7+, Kf8 38. Bxg6, Bxg6 39. hxg6, Ne2 40. a4, Nxf4 41. Rf7+, Ke8 42. Rxf4, Rxe5 and after few more moves a draw was agreed.

Round 9

Jonny - The Baron 1/2
Shredder - Ginkgo 1/2
Komodo - Chiron 1/2

Round 10

The Baron - Komodo 1/2
Chiron - Shredder 1-0
Ginkgo - Jonny 0-1