Structurally complex reservoirs form a distinct class of reservoir in which fault arrays and fracture networks, in particular, exert an overriding control on petroleum trapping and production behaviour. With modern exploration and production portfolios now commonly held in geologically complex settings, there is an increasing technical challenge to find new prospects and to extract remaining hydrocarbons from these reservoirs. This volume reviews our current understanding and ability to model the complex distribution and behaviour of fault and fracture networks, highlighting their fluid compartmentalizing effects and storage–transmissivity characteristics, and outlining approaches for predicting the dynamic fluid flow and geomechanical behaviour of these reservoirs. This collection of 25 papers provides an overview of recent progress and outstanding issues in the areas of (i) structural complexity and fault geometry, (ii) detection and prediction of faults and fractures, (iii) compartmentalizing effects of fault systems and complex siliciclastic reservoirs and (iv) critical controls affecting fractured reservoirs.