

Contents

| | | |
|----------|---|-----------|
| 1 | Introduction | 1 |
| 2 | ESM Workflow | 5 |
| 2.1 | What is a Workflow? | 6 |
| 2.2 | Example: FRE, the FMS Runtime Environment | 6 |
| 2.3 | Discussion: Workflows and Curators | 11 |
| | References | 12 |
| 3 | Applying Scientific Workflow to ESM | 15 |
| 3.1 | Use Case and its Requirements | 16 |
| 3.2 | Components of the Use Case | 18 |
| 3.2.1 | Computing Environment and Extensions | 19 |
| 3.2.2 | Kepler Scientific Workflow System and Extensions | 20 |
| 3.3 | Conclusion | 26 |
| 3.4 | Future Directions | 27 |
| | References | 28 |
| 4 | Configuration Management and Version Control in Earth System Modelling | 31 |
| 4.1 | Introduction | 31 |
| 4.2 | Role 1. The Infrastructure Developer and Supporter | 33 |
| 4.3 | Role 2. The Scientific Developer | 35 |
| 4.4 | Role 3. The Configuration Developer Team | 37 |
| 4.5 | Role 4. The Configuration Manager | 39 |
| 4.6 | Role 5. The Model Release Manager | 40 |
| 4.7 | Collaborative Developer | 41 |
| 4.8 | Summary and Discussion | 42 |
| | References | 43 |

| | | |
|----------|--|----|
| 5 | Building Earth System Models | 45 |
| 5.1 | Requirements | 45 |
| 5.2 | Methods to Accelerate the Build | 46 |
| 5.3 | The ‘Make’ Utility | 48 |
| 5.4 | Example: The SCE Build System | 50 |
| 5.5 | Discussion | 53 |
| | References | 54 |
| 6 | Running and Monitoring | 55 |
| 6.1 | Introduction | 55 |
| 6.2 | General Architectural Principles of Job Scheduling Systems | 55 |
| 6.3 | Requirements | 56 |
| 6.4 | Tools Available at Major Climate Research Centers | 57 |
| 6.4.1 | SMS | 57 |
| 6.4.2 | Installation and Hardware Support | 59 |
| 6.4.3 | Task Definition Language | 59 |
| 6.4.4 | Macro Variables | 59 |
| 6.4.5 | Dependency Declaration | 60 |
| 6.4.6 | Starting Tasks | 60 |
| 6.4.7 | Special Large Installation Features | 61 |
| 6.4.8 | A Use Case | 61 |
| 6.5 | XCdp GUI | 61 |
| 6.5.1 | Main Monitoring View | 63 |
| 6.5.2 | Task View | 63 |
| 6.5.3 | Security | 63 |
| 6.6 | Ant and Frameworks | 63 |
| 6.7 | Job Scheduler | 66 |
| 6.8 | Conclusion | 67 |
| 6.9 | Future Directions | 68 |
| 7 | Configuring, Building and Running Models in GENIE | 69 |
| 7.1 | Access to the Modelling Framework | 70 |
| 7.2 | Model Configuration | 71 |
| 7.3 | Building | 73 |
| 7.4 | Running and Monitoring | 75 |
| 7.5 | Discussion | 77 |
| | References | 78 |
| 8 | Configuring, Building and Running Models in CIAS | 79 |
| 8.1 | Introduction | 79 |
| 8.2 | CIAS Framework | 80 |
| 8.3 | Experiment Configuration and Execution | 83 |

| | |
|---|-----------|
| Contents | xiii |
| 8.4 Conclusion and Future Development | 84 |
| References | 85 |
| 9 Summary and Conclusions | 87 |
| Glossary | 91 |
| Index | 95 |

Earth System Modelling - Volume 5

Tools for Configuring, Building and Running Models

Ford, R.; Riley, G.; Budich, R.; Redler, R.

2012, XV, 97 p. 23 illus., Softcover

ISBN: 978-3-642-23931-1