

## NetCracker Framework Overview

### The Importance of Application Architecture

To cost-effectively manage your business, you need to ensure that systems in your back office are flexible enough to grow and change with your business. With software technologies and architectures changing rapidly, something that was state of the art yesterday is considered “legacy” today. Telecom technologies and the market itself are evolving into a convergent world, quickly making obsolete systems that were designed to support a single technology or service. If you don’t plan for change, you will find that you have numerous systems “silos” which will make your maintenance costs (for personnel, data center resources, technical support from software vendors, etc.) grow exponentially. In highly integrated environments, you will also need constant updates for all the multiple integration points between disparate applications. The bottom line: your Total Cost of Ownership (TCO) will be excessively high if you are forced to rely on multiple, disparate applications deployed in a so-called “best of breed” environment, and your ability to rapidly introduce new services

will be seriously impaired.

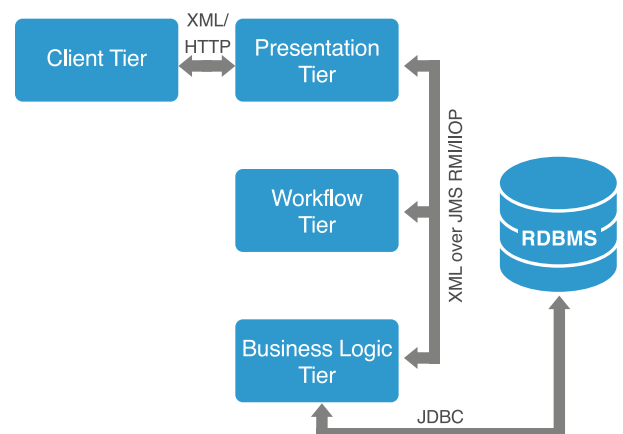
To address this problem, there are two growing trends in application development. One is to provide a pre-integrated solution consisting of multiple modules based on a flexible, configurable common technological platform. The other is to provide a Service-Oriented Architecture (SOA), which allows for easier integration between components and also provides a necessary level of abstraction between components, making them easier to update.

The NetCracker TOMS (Telecom Operations and Management Solutions) Suite provides the best of both worlds. It covers eight critical product areas (Customer Management, Product Management, Revenue Management, End-User Devices, Service Fulfillment & Assurance, IT Platforms, Resource Management, and Network Management), all pre-integrated and developed on top of a unified, flexible, modern n-tier platform that also provides full support for SOA environments.

The NetCracker product suite is built entirely in Java using an n-tier architecture as defined by Sun’s Java Enterprise Edition (J2EE) blueprints. All components of the NetCracker product line are designed as n-tier applications with a clear architectural separation between the Client, Presentation, Business, and Data tiers with an additional Workflow tier for high configurability and full support for process automation.

NetCracker application logic runs inside a J2EE-compliant application server such as BEA WebLogic or IBM WebSphere. All customer data, including configuration meta data, is stored in a centralized Oracle relational database and is accessed via standard JDBC interfaces. Unlike “J2EE-enabled” competing products that started as client-server architectures that were later “wrapped” by a thin application server layer, Net-

### NetCracker N-tier J2EE Architecture



Cracker does not have any legacy business logic code like stored procedures, triggers, and such at the Database tier, making the system more scalable, streamlined, and easy to maintain and upgrade.

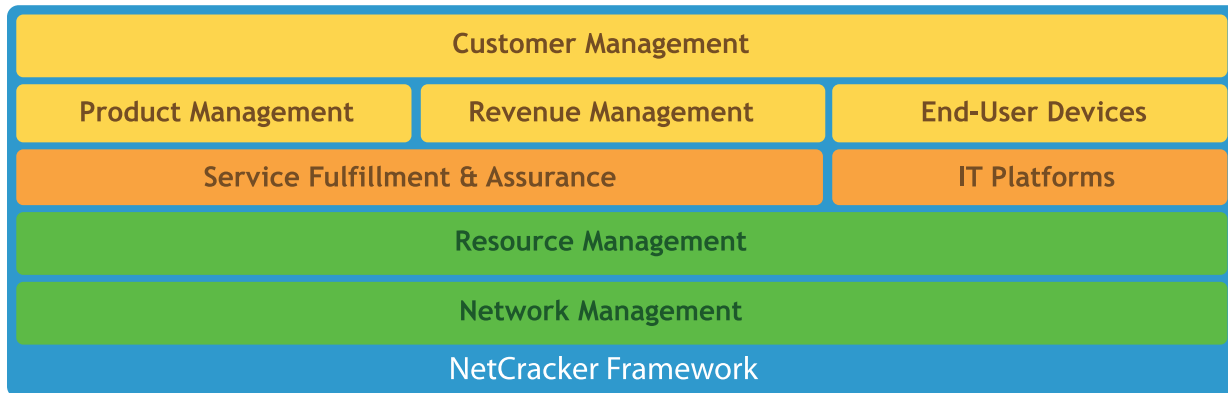
### NetCracker Framework Platform

NetCracker’s integrated product portfolio is based on a mature, scalable, streamlined state-of-the-art Net-

Cracker Framework architectural platform that all NetCracker offerings share. The services provided by

NetCracker Framework—security, object hierarchy, attribute definition, searching, reporting, scheduling, and presentation management—are used by all the NetCracker products, providing a systematic, unified approach to information modeling and operational proce-

dures. This gives the NetCracker TOMS suite a much higher level of integration and significantly greater interoperability between offerings than a typical product suite where separately developed modules are tied together by the vendor or by system integrators.



NetCracker Framework includes a unified, flexible data model with event model and template libraries, a process automation and workflow engine, a unified security system, a reporting environment, advanced administration and management tools, and a fully configurable, 100% web-based user interface with extended visualization capabilities.

### Unified Flexible Data Model

NetCracker Framework's core object model provides all NetCracker modules with unlimited flexibility. Metadata is used to define attributes, relationships, and dependencies among all managed objects including equipment, services, and customers. The core object model provides the foundation for all NetCracker products. All data is stored in an RDBMS structure that does not change with the introduction of new objects, object attributes, or relationships.

### Replicated Database

To reduce the operational database workload, NetCracker provides a Replicated Database (RDB) component that makes available flat-formatted, read-only copies of pre-defined data for search and reporting operations. The component automatically backs up the operational database and allows for the creation of customer-specific reports based on user-configurable rules. As a result of the RDB approach, the number of operational database calls is reduced and overall system performance is improved.

### Historical Data Storage

The Historical Data Storage (HDS) component optimizes data storage operations. Leveraging user-con-

## NetCracker Framework Components

figurable rules, the HDS allows obsolete objects to be moved from the operational database into an independent storage area. The objects can still be viewed, searched, deleted, or moved into an archive.

### Business Activity Monitoring (BAM)

The NetCracker BAM component delivers a configurable tool to monitor, analyze, and evaluate business processes execution, extract real time data, calculate Key Performance Indicators, and provide acquired business metrics for further analysis.

### Task Assignment Rules (TAR)

The TAR component manages task assignment rules that identify users who are suitable for executing tasks. TAR capabilities include rule configuration, automatic filtering of suitable users, and support for load-balancing algorithms, user skill sets, and user availability.

### Template Libraries

NetCracker's unique approach to information modeling is based on user-configurable templates. NetCracker's solution has a large number of template libraries, including one for network equipment, one for different technologies, services, and products, and one for provisioning and activation processes. Template libraries enable the creation of reusable models and eliminate the long and complex process of modeling individual equipment items, products, processes, and services from scratch — thereby accelerating implementation projects and improving accuracy.

### Process Automation & Workflow Engine

The Process Automation & Workflow Engine provides

highly configurable business process automation capabilities. In addition, it manages tasks, milestones, work assignments, and resources.

The business process automation functions are tightly integrated with all products in the NetCracker product suite. All data is available to the business rules and workflow processes as soon as it is entered or loaded into the system. This allows for the retrieval and manipulation of data essential for resource assignment, state transition calculations, or capacity management. To simplify the design and management of automated workflow processes, NetCracker Framework provides extensive support for creating and executing sub-workflows to enable a highly standardized, structured approach to workflow modeling.

### Unified Security System

NetCracker provides a robust security subsystem that allows customers to protect their inventory data effectively by restricting user access to specific information and operations. From an architecture standpoint, the NetCracker security system is based on J2EE (Java Authentication and Authorization Service) standards. Any operation is allowed only after a user has been authenticated and identified (if necessary) in the system. The system supports a single sign-on (SSO) environment, and can work with an LDAP server or other appropriate enterprise login authority (including LDAP, PKI, and Active Directory and UNIX/NT domains), so that once users have entered their credentials it is not necessary to enter them again when moving between web-based or web-enabled UIs from different systems.

For secured intranet environments, basic unencrypted access is employed. For unsecured extranet environments, a secured encrypted transfer protocol such as HTTPS is used.

From a data integrity standpoint, NetCracker provides a multiple level abstract data model, with each level building on top of more abstract levels. Each level has transaction-based access and embedded data integrity control mechanisms. All data objects in the system are assigned to an ACL (Access Control List). These lists define the security privileges for the user or group that accesses the data objects. Default security permissions and containment-based security are also supported.

### Search and Reporting Environment

The NetCracker information model and user interfaces for all products are designed to support extensive, on-the-fly presentation configuration, data filtering and sorting, and even layout changes. As a result, a significant number of “typical” reporting tasks that are performed in most sys-

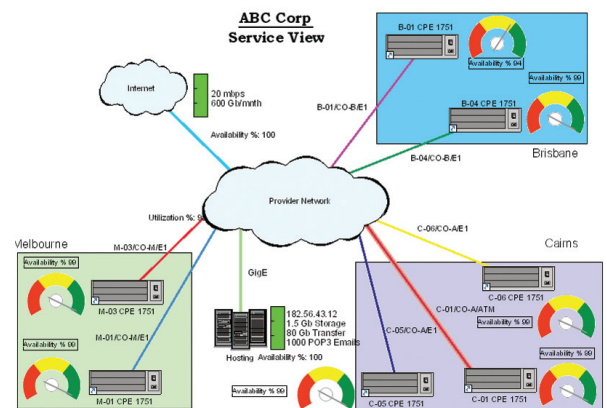
tems do not require pre-canned reports in NetCracker. Instead, the information is available as part of the user interface or is easily accessed using an embedded search engine. This unique NetCracker functionality reduces the need for dozens of pre-built reports (and a small army of IT personnel to write and support them). Instead, users can configure search profiles or even a standard informational screen in a matter of minutes, save it in their profile, and then use it for future reporting needs. The NetCracker report engine is integrated with the entire NetCracker product line and provides the ability to schedule, execute, prioritize, present, customize, and configure both existing (“canned”) and newly created (“custom”) reports.

### Administration and Management Tools

NetCracker Framework includes domain-independent Administrative Tools for system configuration and meta data management with a 100% web-based user interface. An administrator or other authorized user is able to extend a tree of object types with additional sub-types of existing object types (and inherit all parent characteristics), or create new object types from scratch, turn business rules on and off, configure new business rules, manage workflow processes, customize screens, define new forms, configure, create searches and reports, and perform a variety of other tasks important for system configuration and maintenance.

### Information Visualization

From highly visual network diagrams that show precise equipment locations and configurations, to service visualization capabilities, to Gantt charts with delivery milestones, to visual views of the network, service, and customer status, NetCracker products use extensive built-in visualization capabilities to present information in a more intuitive form and thereby increase worker productivity.



## Holistic Approach to Integration

The main principles of NetCracker Framework are unification, openness, flexibility, integrated modularity, and compliance with well-established industry standards. Adherence to these principles allows NetCracker to provide a solid platform for the next generation of business applications while retaining the ability to integrate seamlessly with existing and legacy systems. The NetCracker Framework strategy enables support for “best-of-suite” and “best-of-breed” environments equally well. It also provides a cost-effective way of

upgrading systems without the need for a costly and time-consuming “all-or-nothing” approach that requires the immediate replacement of large legacy systems. NetCracker brings legacy systems together seamlessly as required by the fulfillment and assurance processes while shielding the new components from using them directly. This disentangles the back-office web and allows the service provider to gradually replace its legacy systems.

## Integration Strategy & APIs

Information sharing and process integration across multiple systems—specifically other leading customer management, service management, and network management applications—is critical to an efficient B/OSS.

NetCracker TOMS offerings were designed and implemented with interoperability in mind. Because NetCracker recognized early on that B/OSS solutions present very complex integration challenges due to the high complexity and enormous number of systems and processes in place, NetCracker’s TOMS suite was built from the ground up to support virtually any integration model, so the customer’s solution architect can select whatever integration methodology best suits the environment. As a result, NetCracker provides fully open APIs exposed through a variety of technologies (Java RMI, SOAP/Web Services, JMS, CORBA, COM, Oracle 10g, and others) that are:

- Bi-directional so they can send requests/notifications to NetCracker and receive requests/notifications from NetCracker
- Synchronous and asynchronous, allowing tight, point-to-point and loosely coupled (messaging) integration scenarios

- Fine-grained and bulk, providing a convenient way for single operations or bulk changes
- Transactional and fully secured, protecting information integrity and enforcing authorized access

They also:

- Provide full programmatic access to all functionality and data, including system management functions, business processes, as well as tasks and user data
- Full support for industry standards like OSS/J and SOA

The functionality of all APIs is equivalent regardless of the access method used. NetCracker products employ the same APIs to communicate internally as they do to communicate with external, third-party applications, providing for open and easy integration in best-of-breed scenarios. NetCracker APIs are transactional and provide full access to the data model and system functionality. NetCracker APIs for data access are based on a generic data model concept and are therefore automatically extended as the data model is extended by adding new objects and attributes. NetCracker API backward compatibility is preserved between releases.

## Benefits of NetCracker Framework

- NetCracker Framework is a single, modern, unified technical platform that requires less IT management effort and reduces Total Cost of Ownership (TCO).
- Its advanced integration capabilities provide a cost-effective way of streamlining back-office modernization without high, upfront costs.
- Framework’s flexibility and configurability allow for quick and non-disruptive support for new technologies,

services, and business processes.

- Support for well-established industry standards and template libraries further cuts the time and costs needed for implementation and integration.
- The high level of business process automation and better productivity provided by Framework’s extensive data visualization capabilities increase the efficiency of CSP employees.