restricting use of private members), but cannot enforce encapsulation at runtime because all object properties are accessible at runtime. Future versions of JavaScript may provide *private names* which would enable runtime enforcement of private members.

In the current version of JavaScript, the only way to enforce encapsulation at runtime is to use the module pattern: encapsulate private fields and methods using closure variables. The module pattern is a natural way to provide organizational structure and dynamic loading options by drawing a boundary around a software component. A module can also provide the ability to introduce namespaces, avoiding use of the global namespace for most software components.

The following example illustrates the JavaScript module pattern.

```
(function(exports) {
    var key = generateSecretKey();
    function sendMessage(message) {
        sendSecureMessage(message, key);
    }
    exports.sendMessage = sendMessage;
})(MessageModule);
```

This example illustrates the two essential elements of the module pattern: a *module closure* and a *module object*. The module closure is a function that encapsulates the module's implementation, in this case the variable 'key' and the function 'sendMessage'. The module object contains the exported variables and functions of the module. Simple modules may create and return the module object. The module above takes the module object as a parameter, 'exports', and adds the 'sendMessage' property to the module object. This *augmentation* approach simplifies dynamic loading of modules and also supports separation of module code into multiple files.

The example assumes that an outer lexical scope defines the functions 'generateSecretKey' and 'sendSecureMessage'; it also assumes that the outer scope has assigned the module object to the variable 'MessageModule'.

TypeScript modules provide a mechanism for succinctly expressing the module pattern. In TypeScript, programmers can combine the module pattern with the class pattern by nesting modules and classes within an outer module.

The following example shows the definition and use of a simple module.

```
module M {
    var s = "hello";
    export function f() {
        return s;
    }
}

M.f();
M.s;  // Error, s is not exported
```