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Baker et al.

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(54) **JUST-IN-TIME SERVICES FOR SMALL FOOTPRINT DEVICES**

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(73) Assignee: **Sun Microsystems, Inc.**, Palo Alto, CA (US)

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(52) **U.S. Cl.** **709/203**; 709/310

(58) **Field of Search** ..... 705/35; 700/100, 700/102, 104; 713/201; 235/492; 709/201–203, 213–219, 310, 313–318, 330; 379/93.01; 717/108, 118; 707/10, 103 R, 103 Y; 455/3.01

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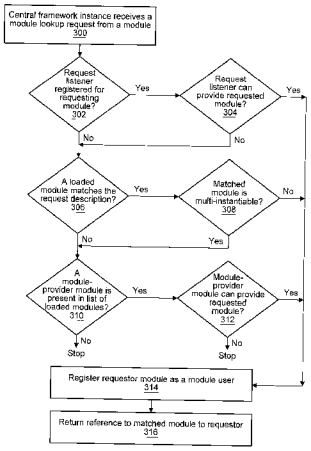
(57) **ABSTRACT**

A lightweight containment framework supporting shareable program modules. The containment framework is sufficiently compact and efficient to run on a wide variety of resource-constrained, small footprint devices, such as personal data assistants (PDAs), smart cellular phones, global positioning system (GPS) receivers, etc. The containment framework provides module management services such as module registration, lookup, instance tracking, etc. The basic functionality provided by the framework may be extended by adding system modules into the framework. The shareable program modules may implement services. Modules may be both service providers and clients of other service modules. The lightweight and efficient nature of the system enables application programs traditionally associated with desktop computer systems, such as web browsers, email clients, etc., to run on small footprint devices. The on-device applications/services built on the containment framework may be integrated with off-device services running on network service providers.

9 Claims, 11 Drawing Sheets



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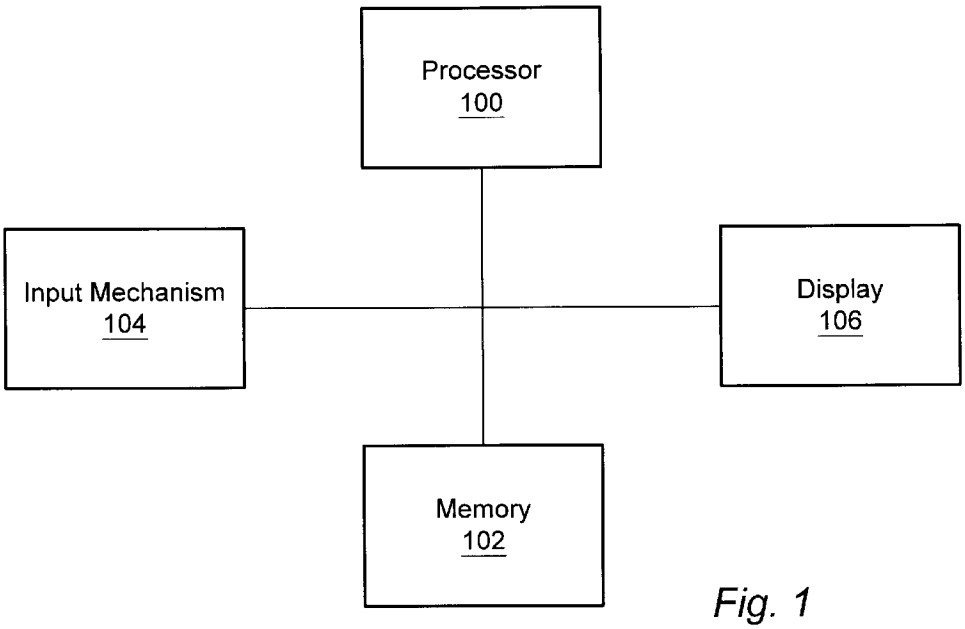

Fig. 1

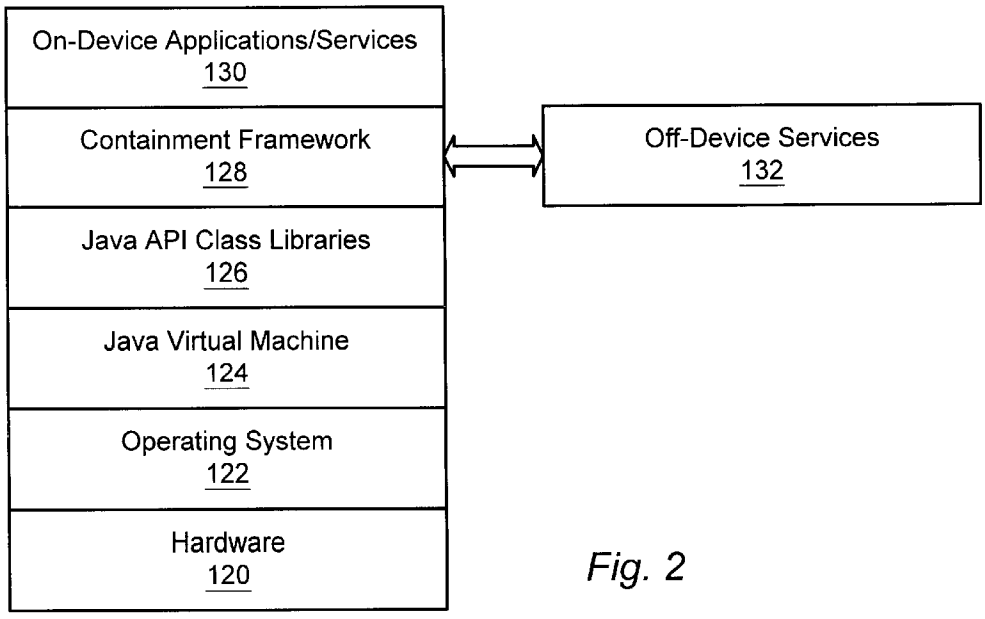

Fig. 2

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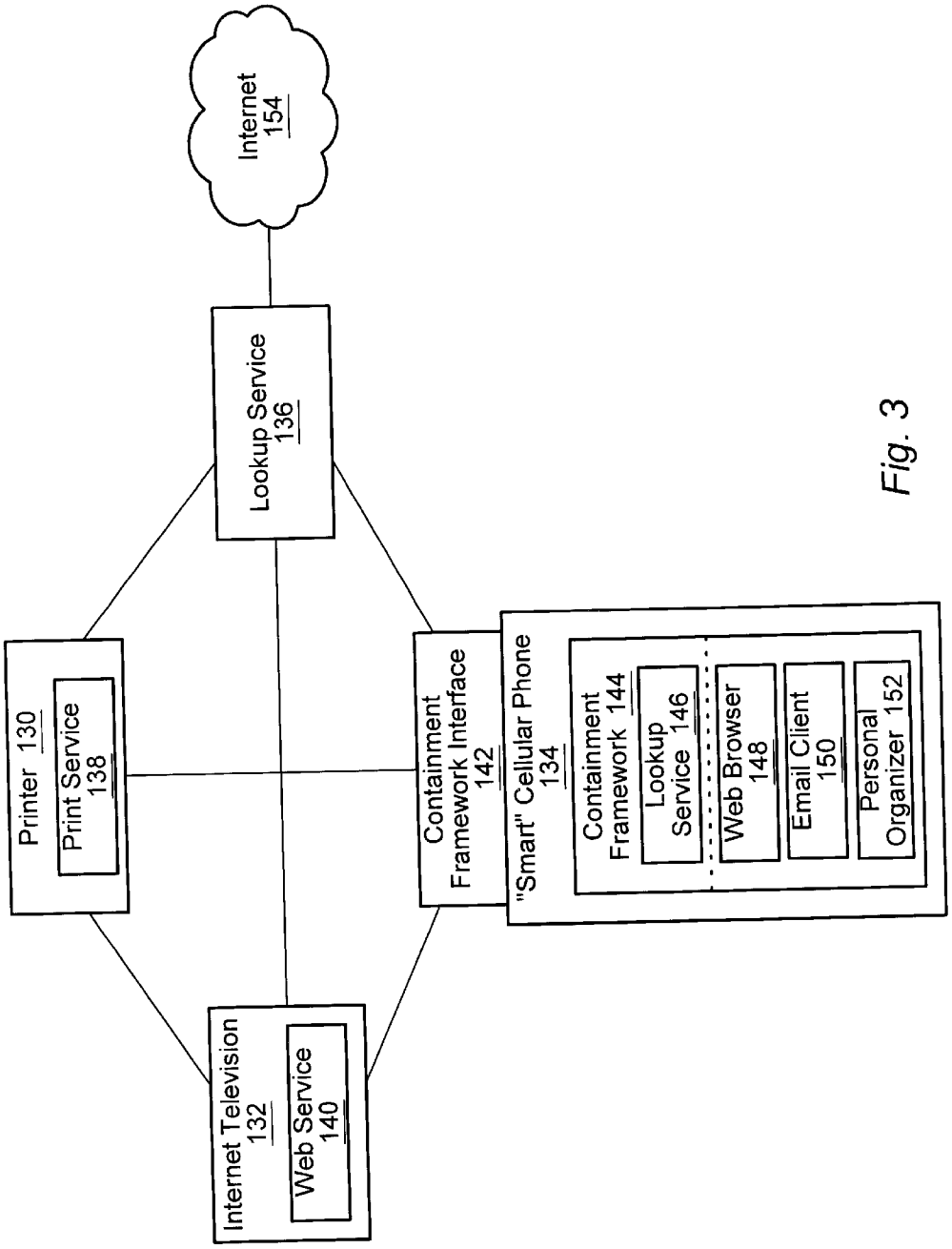

Fig. 3

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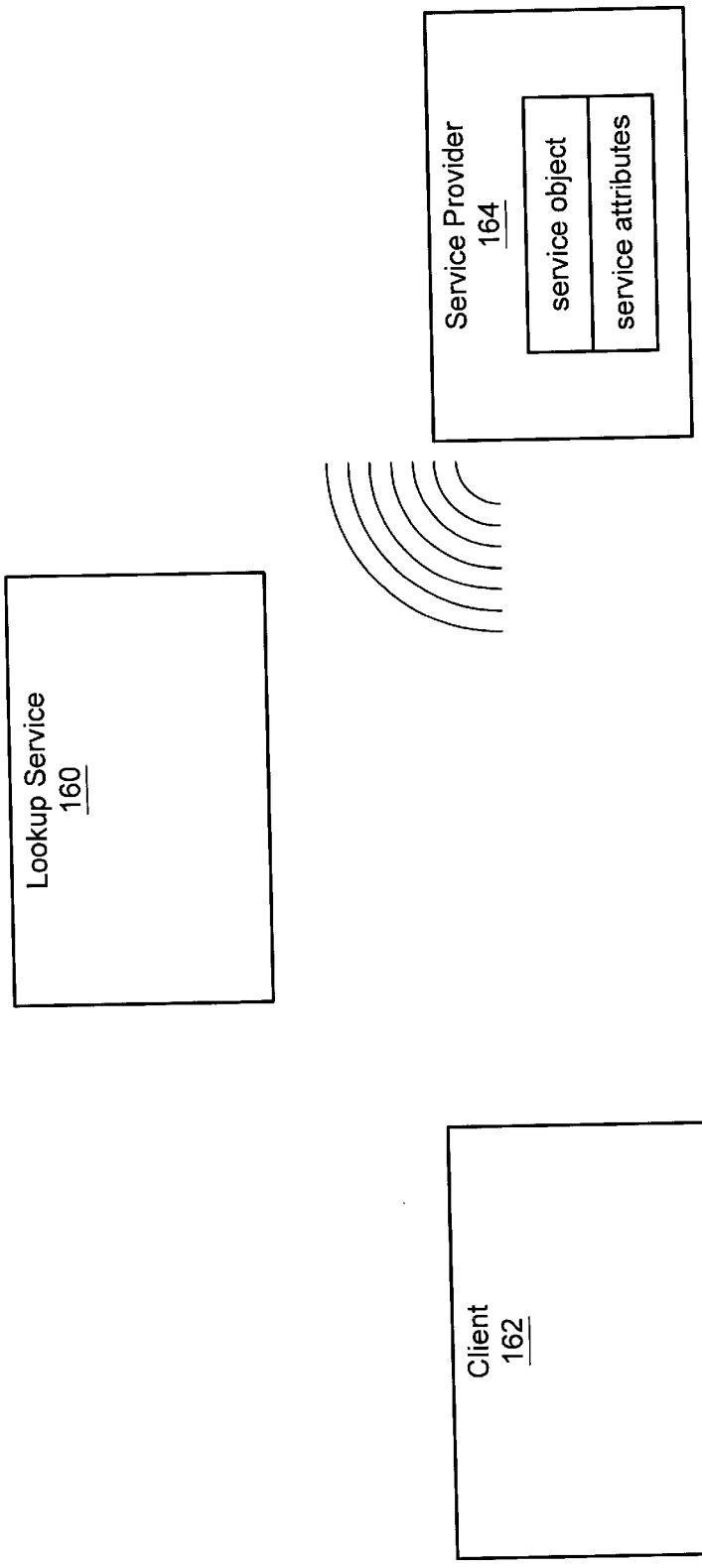

Fig. 4

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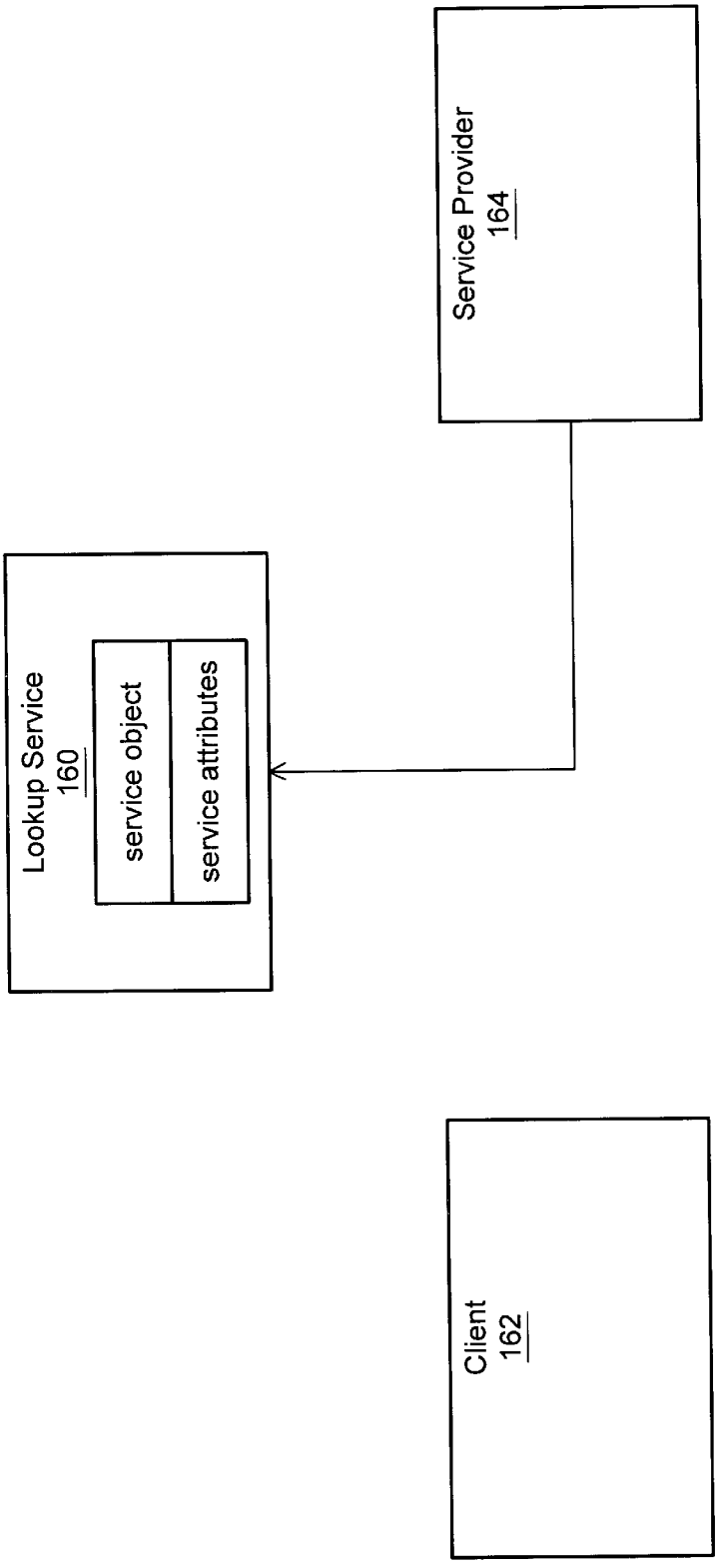

Fig. 5

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